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Standard Loose-Leaf Encyclopedia

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Under the first head—that of size—the new work is so condensed as to occupy but four volumes; under the second head, the articles—always subject to revision—are written throughout in simple, direct, everyday English.

It is unnecessary to enlarge on these essential points of improvement; they at once commend themselves to the great audience to whom they are addressed. There is need simply for the assurance that the condensation of the substance and the simplification of the style has been intrusted to skilled hands, and no effort spared to present briefly, clearly and accurately such information as a really practical up-to-date encyclopedia demands.

The foregoing points of brevity, simplicity, accuracy and constant revision are sufficient to commend the new encyclopedia, specially to the business man and to the masses.

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THE PICK OF THE IVORY MARKET



Measuring Tusks



Bringing in Tusks from the Quayside



Gauging for Billiard Balls



Tusks for Bangles



Weighing the Tusks



A Wonderful Pair of Tusks from Uganda worth about £300, weighing 140 lb. each, and 10 ft. in Length
The great bulk of the ivory sold in London is from African elephants, small quantities coming from Ceylon and India. But the African tusks are the most valuable, and are sold at 18s. 6d.



\$250,000 Worth of Ivory in Sight



\$300,000 Worth of Ivory

STANDARD LOOSE LEAF ENCYCLOPEDIA

1462, died 1505. He greatly enlarged his hereditary possessions, and married Sophia, niece of the last Byzantine emperor, thus introducing the double-headed Byzantine eagle into the Russian coat of arms. He was the first that bore the title of Czar of Great Russia, and proclaimed the unity and the indivisibility of the Russian dominions.—Ivan IV. (or II.), grandson of the former, was born 1530, succeeded in 1534, was crowned in 1547, died 1584. His atrocities gained him the name of The Terrible. Yet he did much to civilize and improve his people, introduced learned men, artists, and mechanics into Russia, and concluded a commercial treaty with England. He killed his eldest son in a fit of rage.

IVORY, the osseous matter of the tusks of the elephant, and of the teeth or tusks of the hippopotamus, walrus, and narwhal. Ivory is esteemed for its beau-

tiful white or cream color, its hardness, the fineness of its grain, and its susceptibility of a high polish. That of the African elephant is most esteemed by the manufacturer for its density and whiteness. The medium weight of an elephant's tusk is 60 lbs., but some are found weighing 170.

IVORY, Vegetable. See Ivory-palm.

IVORY-BLACK, a fine kind of soft black pigment, prepared from ivory dust by calcination, in the same way as bone-black.

IVORY COAST, part of the coast of West Africa, now giving name to a French colony north of Gulf of Guinea.

IVORY-NUTS. See Ivory-palm.

IVORY-PALM, a low-growing, palm-like plant, order Pandanaceæ, native of the warmer parts of South America. It has a creeping caudex or trunk, terminal pinnatifid leaves of immense size, male and female flowers on different plants, and

fruit in the form of a cluster of drupes, weighing about 25 lbs. when ripe. Each drupe contains 6 to 9 seeds, as large as a hen's egg, the albumen of which when ripe is close-grained and very hard, resembling the finest ivory in texture and color. It is therefore often wrought into buttons, knobs for doors or drawers, umbrella handles, and other articles, and is called vegetable ivory. The seeds are also known as Corozo-nuts, and are exported in considerable quantities.

IVY, a climbing plant. The leaves are smooth and shining, varying much in form from oval entire to three and five lobed; and their perpetual verdure gives the plant a beautiful appearance. The flowers are greenish and inconspicuous, disposed in globose umbels, and are succeeded by deep green or almost blackish berries. The ivy attains a great age, and ultimately becomes several inches thick and capable of supporting its own stem.

J

J, the tenth letter in the English alphabet, and the seventh consonant. The sound of this letter coincides exactly with that of g in genius. It is therefore classed as a palatal, and is the voiced sound corresponding to the breathed sound ch (as in church). The sound does not occur in Anglo-Saxon, and was introduced through the French. As a character it was formerly used interchangeably with i, and the separation of these two letters in English dictionaries is of comparatively recent date.



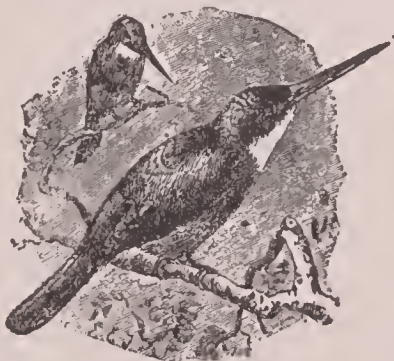
American jabiru.

JABALPUR (ja-bal-pör), Jubbulpore, a town of Hindustan, capital of Jabalpur district, Central Provinces. Pop. 90,316. The district has an area of 3918 sq. miles, a pop. of 748,146. A division or commissionership of the Central Provinces has also the same

name. It has an area of 19,040 sq. miles, a pop. of 2,375,642.

JAB'IRU, a name of wading birds of the crane kind, resembling the stork, and inhabiting South America, Africa, and Australia.

JACAMAR', a genus of brilliant birds nearly allied to the kingfishers, differing, however, by the form of their beaks and



Jacamar.

feet. They live in damp woods, and feed on insects. Most if not all are natives of tropical America.

JAC'ANA, the common name of gullatorial or wading birds, having long toes with very long nails, so that they can stand and walk on the leaves of aquatic plants when in search of their food, which consists of worms, small fishes, and insects. They inhabit marshes in hot climates, and somewhat resemble the moorhen, to which they are very closely allied.

JAC'KAL, an animal of the dog genus resembling a dog and a fox, a native of

Asia and Africa. The general color is a dirty yellow. The jackal is gregarious,



Mexican jacana.

hunting in packs, rarely attacking the larger quadrupeds. They feed chiefly on



Black-backed jackal.

carion, and are nocturnal in habits. The jackal interbreeds with the common dog, and may be domesticated.

JACK-A-LANTERN. See Ignis Fatuus.
JACKASS, Laughing. See Laughing Jackass.

JACKDAW, a common bird of the crow family, smaller than the rook, having a comparatively short bill and whitish eyes; hinder part of the head and neck of a grayish color, back and wings glossy



Jackdaw.

black. The average length is about 12 inches. The nests are built in towers, spires, and like elevated situations, and often in towns. The eggs, from five to six, are of a greenish color. Its food consists of worms, insects, and larvæ. Like their neighbors the rooks, they are gregarious. They are readily domesticated, and may be taught to pronounce words distinctly. Like the magpies, they have attained a notoriety for thieving.

JACKSON, a flourishing town in Michigan, 76 miles west of Detroit, an important railway center, with coal-mines, foundries, engine-works, various manufactures, and the state prison. Pop. 28,000.

JACKSON, a town in Tennessee, with a baptist university and trade in cotton. Pop. 16,400.

JACKSON, the capital of Mississippi, on the Pearl river, 45 miles east of Vicksburg, with a handsome state house. Pop. 9,100.

JACKSON, Andrew, president of the United States from 1829 to 1837, was born in South Carolina in 1767, his father, by origin a Scotchman, having



Andrew Jackson

died before his birth. In his fourteenth year, on the outbreak of the American revolution, he joined a regiment of volunteers to fight in the cause of independence. After losing two brothers in the struggle, he retired from military

service and devoted himself to law. He became a judge of the supreme court, representative of Tennessee in congress, and senator. When, in 1812, war was declared against England, he was made major-general of the Tennessee militia. In 1813 he defeated the Creek Indians, who were wasting the country with fire and sword, and made himself master of Pensacola. While engaged in the defense of New Orleans, he established his military reputation by his repulse of the British there in 1815. From 1817-18 he was employed against the Seminole Indians. In 1828 and again in 1832 he was elected president, and the eight years during which he held his office were marked by the rapid extension of democratic tendencies. In 1837 he retired to his estate in Tennessee, and there he died in 1845.

JACKSON, Charles Thomas, American scientist, born at Plymouth, Mass., in 1805. He spent three years studying in Paris, varied by occasional trips to Germany and Italy. He was state geologist of Maine in 1836, of Rhode Island in 1839, and of New Hampshire in 1840. He claimed to be the discoverer of the anæsthetic properties of ether, which involved him in a dispute with Dr. W. T. G. Morton. His claim was supported by many Boston physicians, and a committee appointed by the French academy of sciences to investigate the matter decided that both men were entitled to recognition. He died in 1880.

JACKSON, Helen Fiske Hunt, American poet and novelist, known by the pen-name of "H. H." was born at Amherst, Mass., in 1831. In 1870 she published a volume of "Verses by H. H.," which was widely read. From this time her pen was constantly employed. The most important of her works are the novels Mercy Philbrick's Choice, Hetty's Strange History and Ramona. She also wrote books for children. Several posthumous volumes were brought out shortly after her death among them Sonnets and Lyrics. She died in 1885.

JACKSON, Thomas Jonathan, better known as Stonewall Jackson, an American general, born in 1824 in Virginia. In 1842 he entered the military academy at West Point as cadet. Four years later he received a second-lieutenant's commission, and was engaged in the Mexican war, and for his gallantry was made a captain, and afterward raised to the rank of major. In 1852 he resigned his commission and was appointed professor of mathematics and artillery tactics in the military institute at Lexington, Virginia. On the outbreak of the civil war in 1861 he entered the southern army with the rank of brigadier-general. He commanded the reserve at Bull's Run, and acquired his cognomen of "Stonewall" by the firmness of his troops and his own coolness in the heat of the action. By the end of the year he was made major-general. In June, 1862, he was defeated by General Banks at Cross Keys, but made a masterly retreat. In August he gained the second battle of Bull's Run, and captured Harper's Ferry in September. In the same month he supported Lee at Antietam, and again at Fredericksburg

in December. In 1863 he took a prominent part in the battle of Chancellorsville. On the evening of the battle he died of wounds inadvertently received from his own men, 9th May, 1863. He



"Stonewall" Jackson.

was a man of indomitable energy and deep religious feeling.

JACKSONVILLE, a town in Illinois, on a fertile prairie, near a small affluent of Illinois river. It has some elegant public buildings, and various educational and charitable institutions, including the Illinois college, and state asylums for the blind, insane, and deaf and dumb. Pop. 18,400.

JACKSONVILLE, a town in Florida, the principal port on the river St. John, 25 miles from its mouth, with an active steamboat traffic and a large trade in lumber, cotton, etc. Pop. 1909, 62,000.

JACOB, the son of Isaac, and the grandson of Abraham, the last of the Jewish patriarchs, and the true ancestor of the Jews. Having craftily obtained from the blind and infirm Isaac the blessing of the first-born in place of his brother Esau, he was obliged to flee from the anger of his brother, and took up his abode with his uncle Laban. Here he served twenty years, and obtained Leah and Rachel as his wives. On his return to Canaan he was met by an angel, with whom he wrestled all night, and having gained the victory was thereafter named Israel, that is, the hero of God. Hence the Hebrews from him are called Israelites. A severe blow to him in his old age was the loss of his favorite son Joseph, whose brothers had sold him to Ishmaelite merchants, and led Joseph to believe that he had been devoured by wild beasts. Joseph subsequently became the highest officer at the court of Pharaoh in Egypt, and thus was the means of bringing the whole house of his father to that country. Jacob died, aged 147 years, approximately about 1860 B.C., and according to his wish was buried in the tomb of Abraham, before Mamre in Canaan.

JACOBEAN ARCHITECTURE, a term applied to the later style of Elizabethan architecture from its prevailing in the time of James I. (L. Jacobus, James). It differed from the pure Elizabethan chiefly in having a greater admixture of debased Italian forms.

JACOBINS, the most famous of the clubs of the first French revolution. When the states-general assembled at Versailles in 1789, it was formed and called the Club Bréton. On the removal of the court and national assembly to Paris it acquired importance and rapidly increased. It adopted the name of Société des Amis de la Constitution, but

as it met in a hall of the former Jacobin convent in Paris, it was called the Jacobin Club. It gradually became the controlling power of the revolution, and spread its influence over France, 1200 branch societies being established before 1791, and obeying orders from the head-



Jacobean architecture—Waterstonhall, Dorset.

quarters in Paris. In 1791 the publication of the *Journal de la Société des Amis de la Constitution* increased the zeal and number of the societies. The Jacobins were foremost in the insurrectionary movements of June 20 and August 10, 1792; they originated the formidable *commune de Paris*, and changed their former name to *Les Amis de la Liberté et de l'Égalité*. For a while they ruled supreme, and the convention itself was but their tool. Robespierre was their most influential member; they ruled through him during the reign of terror, and were overthrown after his downfall in 1794. In that year the convention forbade the affiliation of societies; the Jacobin club was suspended and its hall was closed. The term Jacobin is now often used to designate anyone holding extreme views in politics.

JACOBITES, Monophysite Christians in the east, who were united by a Syrian monk, Jacobus Bardai (578), during the reign of Justinian, into a distinct religious sect. The Jacobites, so styled from their founder, consist of about 30,000 or 40,000 families, and are governed by two patriarchs, appointed by the Turkish governors, one of whom, with the title of the Patriarch of Antioch has his seat at Diarbekir; the other resides in a monastery near Mardin, under the style of Patriarch of Jerusalem. Circumcision before baptism and the doctrine of the single nature of Christ (hence their name monophysites) are common to them with the Copts and Abyssinians; but in other respects they deviate less than the other monophysites from the discipline and liturgy of the orthodox Greek Church.

JACQUARD (zhāk-är), Joseph Marie, the inventor of the famous machine for figured weaving named after him, was born at Lyons in 1752. The subsequent prosperity of Lyons is largely attribut-

able to his invention, and a more enlightened generation erected a statue to him on the very spot where his loom was publicly destroyed. He died in 1834.

JACQUARD LOOM, a form of loom, the characteristic of which is a contrivance appended to it for weaving figured goods in various colors. See Weaving.

JAFFA (anciently Joppa), a maritime town in Palestine, 31 miles northwest of Jerusalem, picturesquely situated upon an eminence the port of Nablus and Jerusalem, with which latter it is now connected by railway. Pop. about 30,000.

JAGANNATHA (jag-an-nāt'ha), often written Juggernaut, the name given to the Indian god Krishna, the eighth incarnation of Vishnu, and to a very celebrated idol of this deity in a temple specially dedicated to Jagannātha at Puri, a town in Orissa, on the Bay of Bengal. Great numbers of pilgrims, sometimes a hundred thousand, at the time of the festivals of Jagannātha, assemble from all quarters of India to pay their devotions at his shrine. On these occasions the idol is mounted on a huge car resting on sixteen wheels, which is drawn by the pilgrims; and formerly, it is said, people were wont to throw themselves under the wheels, to be crushed to death, believing that they would thus immediately enter heaven. This practice, however, is now of rare occurrence; and indeed competent authorities maintain that such deaths were always accidental.

JAGUAR (ja-gwār'), the American tiger, a carnivorous animal of South and Central America, sometimes equalling a tiger in size, of a yellowish or fawn color, marked with large dark spots and



Jaguar.

rings, the latter with a dark spot in the center of each. It rarely attacks man unless hard pressed by hunger or driven to bay. The skin is valuable, and the animal is hunted by the South American in various ways.

JAIPUR (jī-pör'), or Jeypore, a state in Rajputana, Hindustan, governed by a maharajah, under the political superintendence of the Jeypore Residency; area about 15,350 sq. miles. The capital Jaipur is one of the finest of modern Hindu cities. Pop. 160,167.

JAISALMER (jī-sal-mār'), or Jeysulmeer, a state of India in Rajputana, under the political superintendence of the western states agency; area, 16,447 sq. miles. Pop. 115,701. Jaisalmer, the capital, is situated on a rocky ridge.

JALANDHAR (jal-an-dhar'), a town of Hindustan, headquarters of district of same name, in the Punjab; pop. 67,735. The district, a fertile tract between the Sutlej and the Beas, has an area of 1433 sq. miles, a pop. of 907,583.

A division or commissionership has also this name; area, 19,006 sq. miles; pop. 4,217,670.

JAL'AP, the name given to the tuberous roots of a twining herbaceous plant, with sharply auricled leaves, and elegant salver-shaped deep pink flowers, growing naturally on the eastern declivities of the Mexican Andes, at an elevation of from 5000 to 8000 feet. The jalap of commerce consists of irregular



Jalap plant.

ovoid dark-brown roots, varying from the size of an egg to that of a hazel-nut, but occasionally as large as a man's fist. The drug jalap is one of the most common purgatives, but is apt to gripe and nauseate. It has little smell or taste, but produces a slight degree of pungency in the mouth.

JALA'UN, a town in a district of the same name in the United Provinces of India, 110 miles s.e. of Agra, in a swampy and unhealthy locality. Pop. 10,057.—The district consists of a plain west of the Jumna; area, 1469; sq. miles; pop. 418,142.

JALISCO (hā-lis'kō), or **GUADALAJARA**, a state of the Republic of Mexico, bounded on the west by the Pacific. It is chiefly mountainous, but well watered and wooded, and the climate is healthy. The soil is fertile, and wheat and barley are abundantly produced. The capital is Guadalajara. Pop. 1,153,891.

JALPAIGURI (jal-pī-gu-rē'), a town of Hindustan, headquarters of district of same name, in Bengal, on the Teesta; pop. 9700.—The district lies south of Bhutan and north of Kuch Behar; area, 2882 sq. miles; pop. 681,352.

JAMAICA, one of the West India Islands, 80 or 90 miles s. of Cuba, the third in extent, and the most valuable of those belonging to the British; 146 miles in length east to west, and 49 miles broad at the widest part; area, 4256 sq. miles. Among the indigenous forest trees are mahogany, lignum-vitæ, iron-wood, logwood, braziletto, etc. The native fruits are numerous, and many of them delicious; they include the plantain, guava, custard-apple, pine-apple, sour-sop, sweet-sop, papaw, cashew-apple, etc. The orange, lime, lemon, mango, grape, bread-fruit tree, and cinnamon-tree have all been naturalized in the island. The chief cultivated vegetable products are sugar, coffee, corn, pimento, bananas and other fruits, ginger, arrow-root. Sweet-potatoes, plantains, and bananas form the chief food of the blacks. The cinchona-tree has been introduced and is spreading. Of wild animals only the agouti and monkey are numerous. Domestic fowls thrive well, and cattle-raising has become profitable. Fish abound in the

sea and rivers. The government is vested in the governor, assisted by a privy-council, and a legislative council composed of fifteen members, nine elected, and other nominated or ex officio. Education is rapidly extending; but the general state of morality seems to be low, judging from the fact that the illegitimate births are between 50 and 60 per cent. Population, 755,730.

Jamaica was discovered by Columbus in 1494, in his second expedition to the New World. In half a century the cruelty of the Spanish conquerors exterminated the natives. It was taken by Cromwell in 1655, and ceded to England by the treaty of Madrid in 1670. Since the abolition of slavery the prosperity of Jamaica has greatly decreased. Of late many Chinese and coolies have been employed in agriculture. In 1865 a serious revolt broke out among the blacks at Morant bay, and was put down with considerable severity, by Governor Eyre. Since that time signs of disaffection have disappeared, and a greater state of comfort is said to prevail among the inhabitants generally. Politically dependent on Jamaica are the Cayman islands, and the Turks and Caicos islands.

JAMES, St., called the Greater, the son of Zebedee and the brother of John the evangelist. Christ gave the brothers the name of Boanerges, or sons of thunder. They witnessed the transfiguration, the restoration to life of Jairus' daughter, the agony in the garden of Gethsemane, and the ascension. St. James was the first of the apostles who suffered martyrdom, having been slain by Herod Agrippa A.D. 44. There is a tradition that he went to Spain, of which country he is the tutelary saint.

JAMES, St., called the Less, the brother or cousin of our Lord, who appeared to him in particular after His resurrection. He is called in scripture the Just, and is probably the apostle described as the son of Alphæus. He was the first bishop of Jerusalem, and in the first apostolic council spoke against those wishing to make the law of Moses binding upon Christians. The progress of Christianity under him alarmed the Jews, and he was put to death by Ananias, the high-priest, about A.D. 62. He was the author of the epistle which bears his name.

JAMES I., of Scotland, one of the Stuart kings, born in 1394, was the son of Robert III. by Annabella Drummond. In 1405 he was taken by an English squadron, and the prince was carried prisoner to London. Here he received an excellent education from Henry IV. Robert III. died in 1406, but James was not allowed to return to his kingdom till 1424. On his return to Scotland he caused the Duke of Albany and his son Murdoch to be executed as traitors, and proceeded to carry on vigorous reforms, and, above all, to improve his revenue and curb the ambition and lawlessness of the nobles. The nobility, exasperated by the decline of their authority, formed a plot against his life, and assassinated him at Perth in 1437.

JAMES II., King of Scotland, son of James I., when his father was assassinated in 1437 was only seven years of

age. James allied himself with the Douglasses, but being deprived of all real power, he resolved to free himself from the galling yoke. This he did in 1452 by inducing the Earl of Douglas to come to Stirling Castle, where he stabbed him with his own hand. He then quelled a powerful insurrection headed by the next earl, whose lands were confiscated. In 1460 he infringed a truce with England by besieging the castle of Roxburgh and was killed by the bursting of a cannon in the 29th year of his age.

JAMES III., King of Scotland, son of James II., was born in 1453. A plot was formed to dethrone the king, and though many peers remained loyal to him the royal army was defeated at Sauchie, near Stirling, in 1488, the king's son being on the side of the victorious nobles. James escaped from the field, but was murdered during his flight.

JAMES IV., King of Scotland, born 1472, son of James III. Henry VII., then king of England, tried to obtain a union with Scotland by politic measures, and in 1503 James married his daughter, Margaret. A period of peace and prosperity followed. French influence, however, and the hostility of the border chieftains led to angry negotiations, which ended in war. James invaded England with a large force, and himself and many of his nobles perished at Flodden Field in 1513.

JAMES V., of Scotland, born in 1512, succeeded in 1513, at the death of his father, James IV., though only eighteen months old. His mother, Margaret of England, governed during his childhood, Henry VIII., having broken with Rome, and eager to gain over his nephew to his views, proposed an interview at York; but James never came, and this neglect enraged Henry. A rupture took place between the two kingdoms, but James was ill supported by his people, and the disgraceful rout of his troops at Solway Moss broke his heart. He died in 1542, seven days after the birth of his unfortunate daughter Mary.

JAMES I., of England and VI. of Scotland, the only son of Mary, queen of Scotland, by her cousin Henry, Lord Darnley, was born at Edinburgh castle in 1566. In 1567 his mother being forced



James I. of England.

to resign the crown he was crowned at Stirling. When his mother's life was in danger he exerted himself in her behalf (1587); but her execution took place, and he did not venture upon war. In

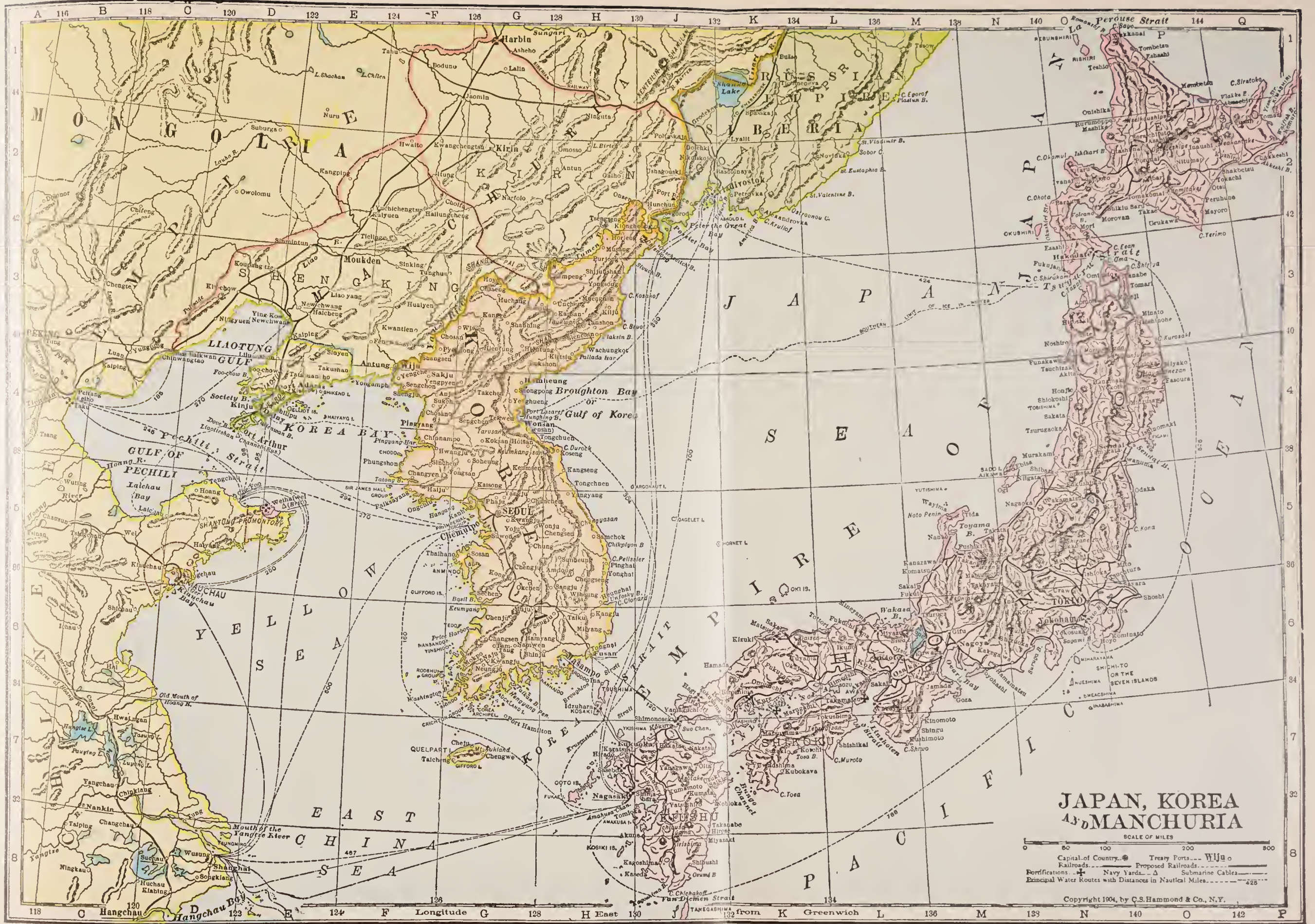
1589 he married Princess Anne of Denmark. In 1603 he succeeded to the crown of England, on the death of Elizabeth, and proceeded to London. One of the early events of his reign was the Gunpowder plot. In 1606 he established episcopacy in Scotland. In 1613 his daughter Elizabeth was married to the elector palatine, an alliance which ultimately brought the present royal family to the throne. He wished to marry his son Charles, prince of Wales, to a Spanish princess, but this project failed, and war was declared against Spain. The king, however, died soon after in 1625. His name is sullied by the part he played in bringing Raleigh to the block. In his reign the authorized translation of the Bible was executed.

JAMES II., of England, second son of Charles I. and of Henrietta Maria of France, was born in 1633, and immediately declared Duke of York. At the restoration in 1660 he got the command of the fleet as lord high-admiral. He had previously married Anne, daughter of Chancellor Hyde, afterward Lord Clarendon. In 1671 she died, leaving two daughters, who became successively queens of England. He succeeded his brother as king in 1685, and at once set himself to attain absolute power. He accepted a pension from Louis XIV. that he might more readily effect his purposes especially that of restoring the Roman Catholic religion. The result of this action was the revolution of 1688, and the arrival of William, prince of Orange. Soon James found himself completely deserted, and he repaired to France, where he was received with great kindness and hospitality by Louis XIV. Assisted by Louis he was enabled in 1689 to attempt the recovery of Ireland; but the battle of the Boyne, fought in 1690, compelled him to return to France. All succeeding projects for his restoration proved equally abortive, and he spent the last years of his life in acts of ascetic devotion. He died at St. Germain's in 1701.

JAMES III., the Pretender. See Stuart (James Edward Francis).

JAMES, George Payne Rainsford, English novelist, born in London in 1801. While still very young he manifested a considerable turn for literary composition, and produced, in 1822, a *Life of Edward the Black Prince*. Some years afterward he composed his first novel, *Richelieu*, which was shown in manuscript to Sir Walter Scott, and published in 1829. Its success determined him toward fiction, and a series of novels, above sixty in number, followed from his pen in rapid succession, besides several historical and other works. Latterly he accepted the office of British consul, first at Richmond, Virginia, and afterwards at Venice, where he died in 1860.

JAMES, Henry, American novelist and essayist, born in New York in 1843. He has lived much on the European continent and in England. His novels and tales which depend for their interest on the portrayal of character rather than on incident, are numerous. Among them are: *Daisy Miller*, *A Passionate Pilgrim*, *Roderick Hudson*, *The Portrait of a Lady*, *Tales of Three Cities*, *The Bos-*



JAPAN, KOREA AND MANCHURIA

SCALE OF MILES
0 50 100 200 300 400
Capital of Country. ● Treaty Ports. — W.U. —
Railroads. — Proposed Railroads. —
Fortifications. + Navy Yards. — Submarine Cables. —
Principal Water Routes with Distances in Nautical Miles. —

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tonians, Princess Casamassima. He has also written the life of Hawthorne in the English Men of Letters series, French Poets and Novelists, etc.

JAMES, Jesse W., American outlaw, born in Clay co., Mo., in 1847. During the civil war he joined Quantrill's guerrillas and won a reputation for reckless daring. In 1866 he was outlawed and was constantly pursued by officers of the law. He earned a world-wide notoriety by the crimes he committed, his romantic adventures and his almost invariable success. Governor Crittenden offered a reward of \$10,000 for his capture, dead or alive, and two members of his own band tempted by the bribe, killed him in his home at St. Joseph, Mo., in 1882.

JAMES RIVER, a river in Virginia, which passes the towns of Lynchburg and Richmond, and communicates, through Hampton roads and the mouth of the Chesapeake bay, with the Atlantic. Its general course is south of east, and its length is 450 miles. The first English settlement in America was formed at Jamestown, 32 miles from the mouth of this river, in 1607.

JAMES' BAY, the southern extension of Hudson's bay, called from Captain James, who wintered here in 1631-32 while trying to find the n.w. passage. It has numerous rocks and islands, and its navigation is dangerous.

JAMESTOWN, a city in Chautauqua co., N. Y., on the outlet of Chautauqua Lake, which supplies water-power, and is employed in several mills. It has manufactories of woolens, alpaca, etc. Pop. 26,890.

JAMESTOWN EXPOSITION, which opened April 26, 1907, was held to commemorate the tercentenary of the first permanent English colony in America which was made by 105 persons in 1607. The importance of this date in American colonial history made the exposition one in which historical significance was the most prominent feature and the exhibit of the national government was largely designed for that purpose, \$1,500,000 being appropriated for that end. The buildings erected by the states were also for the most part replicas of historic structures, that of Pennsylvania being a duplicate of Independence hall and Kentucky of the home of Daniel Boone and so on throughout. One of the chief attractions was a naval display in which not only vessels of the American navy but of Great Britain, France, Germany, Japan, Portugal, and Italy took part. The total cost of the exposition is estimated at \$10,000,000.

JANESVILLE, a city in Wisconsin, on both sides of Rock river, with active trade and manufactures. Pop. 15,460.

JANIZARIES (Turkish, *Jeni-tcheri*, new soldiers), an Ottoman infantry force somewhat analogous to the Roman praetorians, part of them forming the guard of the sultan. They were originally organized about 1330, and subsequently obtained special privileges, which in time became dangerously great. The regular janizaries once amounted to 60,000, but their numbers were afterward reduced to 25,000. The irregular troops amounted to 300,000 or 400,000.

Their power became so dangerous and their insurrections so frequent that several unsuccessful attempts were made to reform or disband them. At various times sultans had been deposed, insulted and murdered by the insurgent janizaries. At last, in June, 1826, they rebelled on account of a proposal to form a new militia, when the sultan, Mahmoud II., having displayed the flag of the prophet, and being supported by their aga or commander-in-chief, defeated the rebels and burned their barracks, when 8000 of them perished in the flames. The corps was abolished, and a curse laid upon the name. As many as 15,000 were executed, and fully 20,000 were banished.

JANUARY, the first month of the year, consisting of 31 days. It was by the Romans held sacred to Janus, from whom the name was derived. The Roman year originally began with March, and consisted of only ten months. Numa is said to have added January and February. See Calendar.

JANUS, an ancient Latin divinity, after whom the first month of the year was named. He was held in great reverence by the Romans, and was represented with two faces, one looking forward, the other backward. All doors, passages, and beginnings were under his care. His principal festival was New Year's Day, when people gave each other presents. The temple of Janus, which was open in time of war and closed in time of peace, was shut only three times in the long space of 700 years—once in the reign of Numa, again after the first Punic war, and the third time under the reign of Augustus A.D. 744. Vespasian also closed it in A.D. 71.

JAPAN, an island empire in the North Pacific ocean, lying off the east coast of Asia. It comprises four large mountainous and volcanic islands; viz.: Hondo, Kiushiu, Shikoku, and Yesso, besides many other islands and islets, and in particular the Loo-choo and the Kurile groups, and latterly also Formosa. The largest island, Hondo or Nippon, is 800 miles long, and from 50 to 100 miles broad. By the Japanese Nippon or Nipon is employed to describe the whole empire. The name "Jippon," altered by Europeans to Japan, is the Chinese designation. The area of the Japanese islands (excluding Formosa) is 147,600 sq. miles (a fifth more than Britain), with a pop. of 43,760,754.

The Japanese islands form part of the line of volcanic action commencing with the Aleutian isles and terminating in the islands of southeastern Asia. The coasts of the larger islands are extremely irregular, being deeply indented with gulfs, bays, and inlets, which form magnificent harbors. The surface also is generally uneven, and in many instances rises into mountains of great elevation. The island of Hondo is traversed throughout its whole length by a chain of mountains, the highest peak being Fusi-yama (12,230 feet), a dormant volcano covered with perpetual snow. The volcanic vents are numerous in Yesso, Hondo, and Kiushiu, and earthquakes are frequent. The minerals comprise copper, lead, iron, antimony, and sulphur; gold and silver are found,

though not to a great extent. Coal is mined in various parts. The rivers are of no great length; Tonegawa, the longest, is only about 172 miles. Biwa, in the south of Hondo is the principal lake, being some 50 miles in length, with an extreme breadth of 20 miles. The harbors most frequented by foreign vessels are the ports of Yokohama, Hiogo (or Kobé), Nagasaki, Hakodate, Niigata, and Osaka.

The climate ranges from an almost Arctic cold in the north to a nearly tropical heat in the south. In the island of Yesso winter begins about October and continues to April, its course being marked by severe frosts and snowstorms; while in Yokohama, again, the winter is genial, with a bright sky, and a temperature much like England. From July to September the thermometer often ranges as high as 95° in the shade.

The vegetation of Japan is very varied in consequence of its wide range of temperature. Rice of excellent quality, as also wheat, barley, sugar-cane, and millet are largely grown; while ginger, pepper, cotton, and tobacco are cultivated in considerable quantities. Tea has been extensively planted lately. The Japanese are skilful gardeners, and the fruits raised include strawberries, melons, plums, persimmons, figs, loquats, and oranges. Of flowers and flowering shrubs the camellia, azalea, hydrangea, lilies, peonies, the chrysanthemum, daphne, and wistaria are indigenous. The forests are extensive; in the south the palm, banana, and bamboo flourish; while in the north, cedar, pine, maple, camphor, and the kadsu or paper-tree are abundant. The chief domestic animals are the horse, which is small and hardy; the ox, which is used as a beast of burden; the dog, which is held sacred; and the cat, which is of a short-tailed species. Rabbits and guinea-pigs are household pets. Bantam fowls, chickens, ducks, and pigeons are reared for food. Of the wild animals, deer are numerous in the north, bears are to be found in Yesso, while boars, wolves, badgers, foxes, monkeys, and hares are not uncommon. Birds are plentiful; falcons, pheasants, ducks, geese, teal, storks, pigeons, ravens, larks, pelicans, cranes, herons, etc. Fish is one of the chief foods, the principal varieties being salmon, cod, herring, sole and mullet. There are also tortoises, lizards, scorpions, and centipedes; and of the insect tribes there are white-ants, winged grasshoppers, and several beautiful varieties of moths. A considerable number of the Japanese animals are the same as those of Britain, or little different.

The Japanese may be regarded as belonging to the great Mongolian family, though ethnologists recognize more than one element in the population. They are generally distinguished by broad skulls and high cheek-bones; small black eyes, obliquely set; long black hair, and a yellow or light-olive complexion; some are good-looking, and many are well-made, active, and nimble. They are a frugal, skilful, persevering, courageous race, who combine these characteristics with much frankness, good humor, and courtesy. A Japanese gentleman's dress

is a loose garment made of silk, gathered in at the waist by a girdle, and extending from neck to ankle; while over this is thrown a wide-sleeved jacket. In the country a short cotton gown is worn, while the lower classes generally wear but scant clothing. The hair is shaved off the front part of the head, while on the back and sides it is gathered up into a knot and fastened with long pins. As regards both clothing and hair-dressing the women very much resemble the men. They also paint and powder themselves to excess. Polygamy is not practiced, but a husband can have as many concubines as he can afford. The Japanese are a holiday-loving people, and delight in the theater. Their two principle religions are Buddhism and Shintoism. The chief observances of Shintoism are ancestral worship and sacrifice to departed heroes. Buddhism is the popular religion. The Japanese language is dual in its nature. Originally a polysyllabic Mongolian tongue, it has been greatly enriched by the addition of many Chinese words, the latter being much used by the literary and governmental classes. The literature of Japan is extensive, and includes all departments—historical, scientific, biographical, but is especially copious in poetry and romance. Contact with Europe has affected literary productions; European and not native writings are now mostly read.

In native and imitative manufactures the Japanese are exceedingly ingenious. Their artistic treatment of copper, iron, bronze, silver, and gold is of the finest; while in stone carvings, mosaics, wicker, tortoise-shell, crystal, leather, and especially in wood lacquer-work, they are skilful in the highest degree. Of textile fabrics they excel in cotton-goods, crapes, camlet, brocades, but chiefly in



Japanese work-people.

figured silk. Paper is largely made, and its uses—from a house to a handkerchief—are manifold. Japanese decorative art is remarkable for patient but facile treatment of bird, beast, and flower; the absence of perspective and chiaro-oscuro seems even to add to its effect. The modern art productions, however, have been debased by imitations of bad European work. The chief export is silk, tea coming next, while the imports are mostly textile fabrics, sugar, raw cotton, etc. The standard money unit is the yen or dollar, of the value of 49 cents, divided into 100 sens. The coinage consists of

gold, silver nickel, and copper pieces, from the value of 20 yens to $\frac{1}{10}$ sen. There is also a paper currency. The principal weight is the picul = 133 lbs. avoirdupois.

The government of Japan till recently was an absolute monarchy, but a new constitution was proclaimed in February, 1889, providing for the establishment of a House of Peers, partly hereditary, partly elective, partly nominated by the emperor or Mikado (as the ruler is called), and of a House of Commons of 300 members, elected by all men 25 years of age and paying taxes to the amount of 25 dollars annually. There is also a cabinet which includes the prime-minister and the statesmen at the head respectively of the foreign office, the treasury, war, navy, education, public works, religion, justice, and the imperial household. There are resident ministers in most European countries and in the United States. Railways have a length of more than 1900 miles, with nearly 10,000 miles of telegraph-line, while the postal system is excellent. Education is compulsory, the school age being from 6th to 14th year. There is a university at Tokyo, with affiliated colleges. Conscription is the rule, and the army numbers 65,000 men in peace, with a war establishment of 265,000. The navy ranks fifth in effective fighting strength among the navies of the world.

The Japanese profess to have an accurate chronology from 660 B.C., but little confidence can be placed in their annals previous to the 10th century after Christ. A long line of emperors or Mikados reigned over Japan, but for some three hundred years all real power was in the hands of the Shogun or chief minister. Japan was first made known to Europe by Marco Polo. In 1542 it was visited by Mendez Pinto, representing the Portuguese; and in 1549 the Jesuit missionary, St. Francis Xavier, arrived and converted many of the natives. From the overbearing character of the Portuguese traders on the one hand and the jealousy of the Japanese priests, an edict was issued excluding missionaries from the country, and in 1640 the Portuguese were finally expelled. The Dutch established commercial relations in 1600. In 1854 the first modern treaty was made with the United States, and in the same year another was concluded on behalf of Great Britain. A more important treaty with Britain was secured by Lord Elgin in 1858, whereby five ports were fully opened to trade. In 1868 a revolution overthrew the power and office of the Shogun, and the Mikado was restored to his ancient position. All former treaties with European powers were ratified, while the Japanese rapidly became converted to western ideas. The first line of railways was opened from Tokyo to Yokohama in 1872, and the telegraph and telephone have come into common use. Industries of the European type have been successfully started. In 1894 war broke out with China in connection with Korea. The Chinese were driven out of Korea and their country invaded by the Japanese, and when the war ended in 1895, China had to cede Formosa and pay a large war indemnity to

Japan. The virtual annexation of Manchuria by Russia, and her threatened absorption of Korea, led to war between Japan and Russia in February, 1904. The Japanese soon gained command of the sea, and after a striking victory on the Yalu river isolated and invested Port Arthur, and inflicted a series of defeats on the Russians in Manchuria, altogether showing remarkable military and naval skill. (See Russia-Japanese War.)

Peace was re-established Sept. 5, 1905, Japan strengthening her position with a new treaty with Great Britain. In August, 1907, Japan, with the consent of the other powers assumed a protectorate over Korea.

JAPAN CLOVER, a perennial plant with trifoliate leaves, indigenous to China and Japan. Introduced into the United States about 1850, it now forms a valuable forage plant there.

JAPAN CURRENT. See Kuro Siwo.

JAPANING, is the act of applying varnish to such articles as wood, metal, leather and papier-maché, in imitation of the lacquered work of Japan and China. The article to be japanned, being made thoroughly dry, is first brushed over with two or three coats of seed-lac varnish to form the priming. The next coat of varnish is mixed with the ground tint, desired and where a design is intended it is now painted with colors. The whole is then covered with additional coats of varnish, which are dried and polished as applied. Shell-lac varnish or mastic varnish is employed, unless where the fineness or durability of the work requires the use of copal dissolved in alcohol. See Lacquering.

JAPHETH, the second son of Noah (Gen. ix. 24). His descendants, according to Gen. x. 5, peopled the isles of the Gentiles, and thus Japheth is often considered the ancestor of most European races.

JARDINIERE (zhâr-dên-yâr), an ornamental stand for growing plants, used in decoration of an apartment.

JAROSLAV, a town in Russia, capital of the government of same name, on the Volga, 162 miles northeast of Moscow. Pop. 70,610.—The government has an area of 13,000 sq. miles and a population of 1,095,636.

JAS'MINE, Jas'min, the popular name of plants of the genus *Jasminum*. They



Common white jasmine.

are elegant, branched, erect or climbing shrubs, with imparipinnate, trifoliate,

or simple leaves, and (usually cymose) white or yellow flowers, from some of which delicious perfumes are extracted. Also written Jessamine.

JASON, in Greek legend, king of Iolcos in Thessaly, celebrated for his share in the Argonautic expedition. On his return to Iolcos with Medea as his wife, he avenged the murder of his parents and his brother by putting Pelias to death. Unable to retain possession of his throne, however, he fled to Corinth, where, after some time, he married Glaucé (or Creusa), daughter of the king, and put away Medea and her children. (See Medea.) Different accounts are given of his death. See Argonauts.

JASPER, an impure opaque colored quartz, less hard than flint or even than common quartz, but which gives fire with steel. It is entirely opaque, or sometimes feebly translucent at the edges, and presents almost every variety of color. It is found in metamorphic rocks, and often occurs in very large masses. It admits of an elegant polish, and is used for vases, seals, snuff-boxes, etc. There are several varieties, as red, brown, blackish, bluish, Egyptian.—Agate jasper is jasper in layers with chalcedony.—Porcelain jasper is only baked clay.

JASSY (yâsh'shi), a town of Roumania, in Moldavia, on the Bachlui, several miles from the Pruth. Pop. 90,000, 55,000 being Jews.

JAUNDICE, is not specifically a disease, but is rather the indication of bile-coloring matter in the blood, shown by a greenish-yellow color of the skin. This is caused either by disease of the liver, which prevents that organ from separating bile pigments from the blood, or is due to some obstruction in the bile ducts leading to the intestines. The accompanying symptoms are constipation, colic pains, nausea, headache, languor, and itching of the skin. The yellow color first appears on the whiter parts of the body, as the eye, the neck, the chest, etc. From being a mere tinge of yellow it deepens to a dark orange, and sometimes greenish hue. Whether these symptoms are trifling or serious depends entirely on the cause; due attention to diet, with mild laxative medicines, will often prove beneficial. Besides the milder, there is also a malignant form of jaundice which usually ends fatally.

JAUNPUR (joun-pôr'), a town of India, United Provinces, on the river Gumti, over which there is a fine bridge. Pop. 42,771.—The district has an area of 1554 sq. miles; pop. 1,209,663.

JAUNTING-CAR, a light car used in Ireland in which the passengers ride back to back on folding-down seats placed at right angles to the axle, the occupants having their feet near the ground. There is generally a "well" between the seats for receiving luggage, and a seat in front for the driver.

JAVA, an island in the Indian Archipelago, the chief of the Dutch colonial possessions; capital, Batavia. Area, 48,830 sq. miles. Pop. 28,745,698. Rice is the chief cereal, but coffee and sugar are the staple products; spices are also grown, and some cotton is raised. Other products are cochineal, pepper, tobacco,

tea. The famed poison-tree, or upas, is a noted Javanese plant. The forests consist mainly of teak. There are about 100 kinds of mammalia inhabiting Java. These include the one-horned rhinoceros, tiger, panther, tiger-cat, wild hog, several kinds of deer, several monkeys (but not the orang-utan), and enormous bats. The ox, the buffalo, the goat, are among the domestic animals. Birds are numerous. Serpents of a venomous kind are frequent, as also are crocodiles, lizards, and the land tortoise. The native population belong to the Malay race, and are brownish-yellow in complexion with long thick black hair. They are sober, patient, and industrious, but quick to avenge affront. In religion they are nominally Mohammedan. The great mass are devoted to agriculture, living in villages each governed by a native chief. A governor-general rules Java and the whole of the Dutch East Indies. The history of Java is unknown previous to the 11th century, when the Windus founded a dynasty and converted the natives to Brahmanism. This was overthrown by an invasion of the Mohammedans in 1478. Islamism was succeeded by the Portuguese, who arrived in 1511. They were followed by the Dutch in 1595, who wrested from them the supremacy.

JAV'ELIN, a short spear thrown from the hand, and in ancient warfare used by both horse and foot soldiers. The Roman javelin had a barbed iron head and a wooden shaft, the whole length being nearly 7 feet.

JAY, a genus and sub-family of birds belonging to the family of the crows. The jays have the upper mandible or bill notched or indented near its tip, and the feathers on the top of the head are erectile, and can be elevated at will, to form a kind of crest. These birds are readily domesticated, possess a harsh grating note, and are admirable mimics. They feed on fruits, seeds, worms, insects, and the eggs and young of other



The European jay.

birds, etc. The common jay is the size of an ordinary pigeon, the general color is a light brown inclining to red, whilst the larger or primary wing-feathers are of a brilliant blue, marked out by bands of black. The blue color reaches its highest brilliancy in the North American blue jay which otherwise closely imitates its European representative both in size and habits. The blue jay is exceedingly

well known in the United States. Another American jay is the Canada jay or "whisky jack," a bird of rather somber coloring, but of the bold, noisy, and active habits of others of the jays.

JAY, John, American jurist and statesman, born in 1745, died in 1829. In 1768 he was admitted to the bar, and in 1774 was chosen a delegate to the first American congress, which met at Philadelphia. In 1776 he was chosen president of congress, and in 1779 he was appointed minister plenipotentiary to Spain. In 1782 he was appointed one of the commissioners to negotiate a peace with Britain, and, along with Adams



John Jay

and Franklin, concluded a treaty with the British. Returning to the United States he was appointed head of foreign affairs, and afterward chief-justice. In 1794 he was sent as envoy extraordinary to Great Britain, and concluded a treaty which has been called after his name, and by which \$1,000,000 was given to Americans as compensation on account of the illegal captures by British vessels, the eastern boundary of Maine was fixed, etc.

JEDDO. See Yeddo.

JEFFERSON, Joseph, American comedian, was born in Philadelphia in 1829. He appeared as Cora's child in Pizarro when only three years old. In 1856 he made his first trip to Europe. In 1857 he became a member of Laura Keane's company, playing Dr. Pangloss in *The Heir at Law*. In 1858 he played with E. A. Sothorn in *Our American Cousin*, creating the part of Asa Trenchard. He played Rip Van Winkle for the first time in London in 1865, and it became his most famous role. Since then Dr. Pangloss, Bob Acres in *The Rivals*, and Rip Van Winkle have been the principal ones in his repertory. He died in 1905.

JEFFERSON, Thomas, the third president of the United States of America, was born April 2, 1743, at Shadwell, in Albemarle co., Virginia. He studied for two years at the college of William and Mary, Williamsburg, and then commenced the study of law. In 1760 he was elected a member of the provincial legislature, and in 1775 he took his seat for

the first time in congress. It was he who drew up the draft of the declaration of independence, which (in a slightly modified form) was signed on July 4, 1776. In 1779-81 he was governor of Virginia. In May, 1784, congress elected him minister plenipotentiary to France, in addition to Adams and Franklin; next year he was appointed sole minister, and his residence in Europe lasted about five years. On his return he was appointed secretary of state by Washington, an office which he continued to fill until the end of 1793, when he resigned. In 1797 he was elected vice-president of the United States; but he was seldom consulted by the president, and he was out of harmony with the government.



Th. Jefferson

In 1800 he was elected president. One of the public acts of his administration was the purchase of Louisiana from France, thus greatly extending the boundaries of the United States. In 1809 he retired to private life at his residence of Monticello, in Virginia, where he died on the 4th of July, 1826, the fiftieth anniversary of the declaration of independence, almost at the same hour as John Adams, the second president. Jefferson was the acknowledged head of the republican party from the period of its organization. He published Notes on Virginia, and various essays on political and philosophical subjects, and a Manual of Parliamentary Practice, for the use of the senate of the United States.

JEFFERSON CITY, the capital of Missouri and county-seat of Cole co., near the geographical center of the state and 125 miles west of St. Louis; on the south bank of the Missouri river; on the Missouri Pacific, and reached by the Chicago and Alton and the Missouri, Kansas and Texas railroads. Pop. 11,122.

JEFFERSONVILLE, the county seat of Clark co., Ind., on the Ohio river, opposite Louisville, Ky., with which it is connected by two railroad bridges, and on the Pennsylvania, the Baltimore and Ohio Southwestern, the Cleveland, Cincinnati, Chicago and St. Louis, and other railroads. Pop. 13,124.

JEHOSH'APHAT, son of Asa, and

fourth king of Judah, 915-890 B.C. He was noteworthy in his strenuous endeavors to abolish the use of idols. Jehoshaphat denotes "Jehovah's judgment."

JEHO'VAH (Heb. Yahveh), the popular pronunciation of the sacred name of God among the Hebrews, represented in the text of the Old Testament by the four consonants J (or Y), H, V, H. The Hebrews cherished the most profound awe for this name, and this sentiment led them to avoid pronouncing it, and to substitute the word Adonai, which signifies the Lord, which custom still prevails among the Jews. In some portions of the Pentateuch Jehovah is the name regularly applied to God, in others Elohim: this has led to a theory of two authors respectively for these portions. See Elohim.

JELLY, a name for such substances as are liquid when warm, but which coagulate into a gelatinous mass when cold. Animal jelly is prepared from the soft parts of animals, and even from bones when sufficiently crushed. It is a colorless, elastic, transparent substance without taste or smell, and which is soluble in warm water. Analysis shows that its constituents are carbon, hydrogen, nitrogen, with a possibility of sulphur. Vegetable jelly is prepared from the juice of unripe fruit heated in a solution of water to 40° C. This extract when boiled with sugar forms a pleasant and wholesome substance. Doctors now incline to the opinion that animal jelly is less nourishing than ordinary animal food.

JELLY-FISHES, the popular name of certain animals, found in the sea, and often familiarly called sea-blubbers and sea-nettles, from their appearance and stinging property. When in the water they present a singularly beautiful appearance, one of the most common resembling a clear crystalline bell, which swims gracefully through the water by alternately expanding and contracting its body. They are very voracious, and move upon their prey (minute animals) with great rapidity, seizing it with their long stinging tentacles. The phosphorescence of the sea is to some extent explained by the pale light which they diffuse in the darkness.

JENA (yā'nā), a town of Germany, in the grand-duchy of Saxe-Weimar, 12 miles east of Weimar, on the Saale, a place of little importance except for its university, which was opened in 1558. It has about 60 professors or lecturers, an anatomical theater, botanical garden, zoological museum and other scientific collections, observatory, library of 200,000 volumes, and about 600 students. On 14th Oct. 1806, the Prussians (70,000 men) under Prince Hohenlohe were defeated here by the French under Napoleon (90,000 men). Pop. 20,686.

JENNER, Edward, an English physician, celebrated for having introduced the practice of vaccination as a preventive of the small-pox. He was born at Berkeley in Gloucestershire in 1749; studied at London under the celebrated anatomist John Hunter, and afterward settled in Gloucestershire as a medical practitioner. About 1776 the belief common among the peasants that casual

cow-pox acquired in milking cows was a preventive of small-pox, caused him to direct his inquiries to the subject, and led to the introduction of the process of vaccination in 1796. His method at first met with great opposition from the medical profession, but was ultimately universally accepted both by his own and foreign nations. He died at Berkeley in 1823. He published an Inquiry into the Causes and Effects of Cow-pox (1798); Further Observations on Variolæ Vaccinæ or Cow-pox (1799); and a celebrated paper on the Cuckoo in the Philosophical Transactions. See Vaccination.

JEPHTHAH, one of the Hebrew judges, who defeated the Ammonites, but having rashly made a vow that if he was victorious he would sacrifice to God as a burnt-offering whatever should first come to meet him from his house, he was met on his return by his daughter, his only child, whom he sacrificed, in consequence, to the Lord (Judges xi. 29, 40). Some commentators have maintained that this meant devoting her to perpetual virginity in the tabernacle. Jephthah ruled six years as a judge and general (Judges xi., xii.). The sacrifice of Jephthah's daughter is the subject of Handel's last oratorio, and of a Latin drama by George Buchanan.

JER'BOA, a genus of small animals belonging to the order Rodentia or Gnawers, having extremely long hind limbs, which gives them an extraordinary power of leaping, so that their movements seem more like flying than running. The fore limbs are armed with short powerful claws, with which they



Jerboas.

excavate their burrows and extract the roots on which they chiefly live. They are gregarious and nocturnal in their habits, and hibernate during the colder seasons. The jerboas are found chiefly in Asia and Northern Africa. The typical species is the Egyptian form.

JEREMIAH, the second of the great prophets of the Old Testament, flourished during the darkest period of the Kingdom of Judah, under Josiah, Jehoahaz, Jehoiakim, Jeconiah, and Zedekiah. He was called to the prophetic office about 629 B.C., in the reign of Josiah, and lived to see the capture of Jerusalem by Nebuchadnezzar in 586 B.C., who offered him a home at Babylon but he preferred to stay among the wretched remnant of the people left in Judah. He is said to have been stoned to death in Egypt by some of his countrymen, who were irritated by his re-

bukes. He wrote two Old Testament books, the prophecies of Jeremiah and the Lamentations. The text of the prophecies is in a somewhat confused state, there being no chronological order. Jeremiah wants the dignity and splendor of Isaiah, but exhibits great tenderness and elegiac beauty of sentiment. Some critics also attribute to him the book of Deuteronomy and several of the Psalms. See also Jews.

JER-FALCON. See Falcon.

JERICO (jer'-i-kō), a considerable town of ancient Judea, on a plain about 18 miles n.e. of Jerusalem, noted, especially in Solomon's time, for its balsam-gardens and its thickets of palm-trees and roses, and carrying on a flourishing trade in balsam and spices. It was the key of Palestine, and was therefore invested by the Israelites who had passed the Jordan under Joshua to conquer this country. Its site is now occupied by the small village of Riha.

JERKED BEEF, from the Chilian word charqui, beef cut into strips of about an inch thick, and dried in the sun to preserve it. It is used in Chile and other parts of South America, and has been tried in Australia. When well prepared it will keep for a great length of time.

JERKIN-HEAD, in architecture, the end of a roof when it is formed into a shape intermediate between a gable and



Jerkin-head roof.

a hip, the gable rising about halfway to the ridge, so as to have a truncated shape, and the roof being hipped or inclined backward from this level.

JEROBO'AM, the name of two kings of Israel.—Jeroboam I., the son of Nebat, on Solomon's death (973 B.C.) was made king of the ten tribes who separated from Judah and Benjamin. He made Shechem his capital, forbade his subjects to resort to the temple at Jerusalem, and set up golden calves at the shrines of Dan and Bethel. He died in the 22d year of his reign.—Jeroboam II., the most prosperous of the kings of Israel, reigned 823–782 B.C. He repelled the Syrians, took their cities of Damascus and Hamath, and reconquered Ammon and Moab. But licentiousness and idolatry were prevalent during his reign. The authorities for the history of his time are 2 Kings, 1 Chron., Amos, and Hosca.

JER'OME, St., full name Eusebius Hieronymus Sophronius, one of the most learned fathers of the Latin Church, was born sometime between 331 and 345 in Dalmatia, of wealthy parents. Died about 420. His Latin version of the Old Testament from the original language was the foundation of the vulgate.

He took an active part in many controversies, notably those regarding the doctrines of Origen and Pelagius.

JER'ROLD, Douglas, English humorist and play-writer, born in 1803. His first play, *More Frightened than Hurt* (1818), was not at first successful, but his *Black-eyed Susan* (1822) ran for 300 successive nights at the Surrey theater. Jerrold's subsequent dramas were the *Rent-day*, *Nell Gwynne*, the *House-keeper*, the *Prisoner of War*, *Bubbles of a Day*, *Time Works Wonders*, *St. Cupid*, the *Catpaw*, the *Heart of Gold*, and several others. He contributed extensively to periodical literature. To *Punch* he contributed his inimitable *Mrs. Caudle's Curtain Lectures*, *Punch's Letters to his Son*, etc. Though a terrible master of satire and repartee his sayings had no personal malevolence. He died in 1857.

JER'SEY, the largest and most valuable of the Channel islands, about 15 miles off the northwest coast of France; greatest length, east and west, about 12 miles; greatest breadth, 7 miles; area,

comprise glass works, boiler works, foundries, steel works, breweries, sugar refineries, chemical works, watch works, tobacco works, potteries, etc. Its population is largely made up of the overflow of New York. Pop. 1909, 251,000.

JERSEY, NEW. See New Jersey.

JERUSALEM, one of the most ancient and interesting cities in the world, in Palestine, in the Turkish province of Syria. It stands on an elevated site (about 2500 feet above the sea) within the fork of two ravines, the Valley of Jehoshaphat on the east, and the Valley of Hinnom on the south and west, while a third ravine or valley—the Tyropœon—partially traverses it from south to north. On the east side of this valley is Mount Moriah, now the Mohammedan quarter of the city, where anciently stood the palace and temple of Solomon. Immediately south of this stood the mountain fortress of Zion, known as the City of David, and later as the Akra or Lower City. This part of the city is now waste. According to another view, however, the "City of David" is the Upper



Jerusalem in her decay.

28,717 acres or 44.87 sq. miles. The island is fertile, abundantly wooded, and well cultivated. The climate is peculiarly mild and agreeable. Wheat is the principal cereal raised, and large quantities of grapes, peaches, melons, pears, and other fruits are exported, as also vegetables, and especially early potatoes for the London market. Cows of the famous Jersey or Alderney breed are reared and exported in great numbers. The lower classes speak a sort of old Norman-French dialect, while French is the language of the upper classes and the law courts. Jersey has its own legislature, known as the "States." Appeals lie to the queen in council. The island is attached to the diocese of Winchester. Principal town, St. Helier. Pop. 52,796. See Channel Islands.

JERSEY CITY, the capital of Hudson co., New Jersey, on the Hudson, opposite New York, from which it is about a mile distant and with which it is connected by ferries. The manufacturing establishments are very numerous, and

City on the opposite or western side of the Tyropœon Valley, and to this the name of Zion is given by current tradition. This part is where the quarter of the Armenians, the citadel, and the protestant church now are. Of the three walls which Jerusalem latterly possessed the first wall, that of David, was for the defense of this Upper City (the traditional but probably not the ancient Zion). The second wall took in a considerable area on the east and northeast, while a new town or suburb, Bezetha, which grew up on the north of this, was enclosed by a third wall, built by Agrippa I. The present limits are much the same as those indicated by the third wall, only that the old Lower City and the southern part of the old Upper City are unpopulated places outside the modern walls. Of the seven gates only five are now used. The interior of the city is much occupied by mosques, churches, and convents. The houses are substantially built of stone, and present in most cases no windows to the streets,

which accordingly—generally narrow, illpaved, and sloping to the center—are merely long lanes with dead walls on each side of them. In the northwest quarter is the Church of the Holy Sepulcher, so called because alleged to contain under its roof the very grave in which the Savior lay. This church, which was built by Helena, the mother of Constantine the Great, is remarkable for the richness of its decorations and the number of pilgrims by whom it is visited. A large area in the east of the city is occupied by the inclosure known as El Haram-Esh-Sherif (The Noble Sanctuary), which is in the form of a regular parallelogram surrounded on all sides by a lofty wall. The most conspicuous building within is the Mosque of Omar, called also Kubbet-es-Sakhrah (Dome of the Rock), a splendid structure of octagonal form which occupies the site of the Jewish temple. Among the notable convents are the Latin convent, and the still more extensive Armenian convent capable of accommodating 1000 pilgrims. The population is 41,500, of whom 10,000 are Christians, 25,000 Jews, and 6000 Mohammedans.

Jerusalem is not mentioned by name till B.C. 1500, when it was in the hands of the Jebusites. The lower part was wrested from them by Joshua, but the upper part continued in their possession till the time of David, who took up his residence in the stronghold of Zion, and made Jerusalem the capital of his kingdom. It reached the height of its glory under Solomon, after whose time it declined. In 586 Nebuchadnezzar took and destroyed the city after a long siege, and carried off those of the inhabitants whom the sword had spared as captives to Babylon. On the return from the captivity the temple was rebuilt, B.C. 515. The walls were not rebuilt till the time of Ezra and Nehemiah, 455 B.C. The city had regained a considerable degree of prosperity, when it was sacked and its walls levelled by Antiochus of Syria in 168. Under the Maccabees, Jerusalem, in common with Judea, became once more independent, 165 B.C. It next became tributary to Rome, and had been greatly beautified and enriched with a fine new temple by Herod when the Saviour appeared. In A.D. 66 Jerusalem was taken by a party of Jews who had revolted against Rome. Titus, the son of the emperor Vespasian, regained it in the year 70, after a terrible siege; the temple was burned, and the city razed to the ground. In 131 Hadrian ordered the city to be rebuilt, but it continued depressed till the beginning of the 4th century, when, Rome having become Christian, Jerusalem shared in the benefit, and assumed the appearance of a distinguished Christian city, under the fostering care of Helena, mother of Constantine the Great. This period of prosperity, prolonged by a succession of Christian emperors, was suddenly terminated in 636, by the conquest of the Mohammedans, under the Arabian Caliph Omar. In 1099 the Crusaders took Jerusalem by storm, and made it the capital of a Christian monarchy, which with difficulty maintained its existence till 1187, when it was finally overthrown by Saladin. In 1517 Jerusalem fell into the hands of

the Turks, and has remained to this day a part of the Ottoman empire.

JESTER, or COURTFOOL, a buffoon or person maintained by the noble and wealthy to make sport by jests and merry conceits for them and their



Jester—Antiquarian club.

friends. In Britain the last jester regularly attached to the royal household seems to have been Archie Armstrong, the jester of James I. and Charles I.

JES'UITS, or SOCIETY OF JESUS, the most celebrated of all the Roman Catholic religious orders, founded in the 16th century by Ignatius Loyola, and established by a papal bull in 1540, the founder being the first general of the order. The members, in addition to the usual vows of poverty, chastity, and implicit obedience to their superiors, were bound by a fourth, viz. to go whithersoever the pope should send them, as missionaries for the conversion of infidels and heretics, or for the service of the church in any other way. The popes Paul III. and Julius III., seeing what a support they might have in the Jesuits against the reformation, granted to them privileges such as no body of men, in church or state, had ever before obtained. They were permitted to enjoy all the rights of the medicant and secular orders; to be exempt from all episcopal and civil jurisdiction and taxes, so that they acknowledge no authority but that of the pope and the superiors of their order; to exercise every priestly function, parochial rights notwithstanding, among all classes of men, even during an interdict; and they could absolve from all sins and ecclesiastical penalties dispense themselves from the observance of fasts and prohibition of meats, and even from the use of the breviary. Their general was invested with unlimited power over the members, the dispersion of whom throughout society, with the most entire union and subordination, was made the basis of the order. The constitution of the body was drawn up in great part by Loyola himself, but the second general, Laynez, had much to do in directing its early movements.

JESUS CHRIST, the founder of the Christian religion; born in Bethlehem according to the received chronology in the year of Rome 754, but in reality some four years earlier, that is, in 4 B.C. He was born of the Virgin Mary, of the

tribe of Judah, who was betrothed to Joseph, by occupation a carpenter. Two genealogies of Joseph differing very much after the time of David are given, one by Matthew, chap. i.; the other by Luke, chap. iv. Our information concerning him is derived almost entirely from the accounts of his life written by the four evangelists Matthew, Mark, Luke and John, and incidental notices in other parts of the New Testament. Before the birth of the Holy Child, Joseph and Mary, then residing in Nazareth, went to Bethlehem to be taxed, and it was there, in a manger, the inn being full, that Jesus was born. On the night of his birth an angel announced the coming of a Saviour to shepherds tending their flocks by night in the field. On the eighth day he was circumcised according to the law of Moses. Soon after his birth he was hailed by the adoration of the Magi or wise men of the East, who were miraculously directed to the house where the young child was, and presented royal gifts. Herod, alarmed at hearing of the birth of one who was to be King of the Jews, determined to destroy all the male children of Bethlehem and its vicinity of the age of less than two years, for the purpose of effecting the death of Jesus. But Joseph, being miraculously warned of the danger, fled to Egypt with the virgin and her child, and on his return, after the death of Herod, went to reside at Nazareth in Galilee, whence Jesus was often called a Nazarene. We have no further accounts of Jesus till his twelfth year, when his parents took him with them to Jerusalem. Here after being lost for three days he was found in the temple sitting among the doctors hearing them and asking them questions. Regarding the following eighteen years of his life the evangelists are silent. He probably during this period followed his occupation as a carpenter. At the age of about thirty he appeared as a public preacher, having been baptized in the Jordan by John, who recognized him as the Messiah. He then retired to the wilderness, where he passed forty days in fasting, meditation, and prayer previous to being tempted of the devil as described by the evangelists. He then began to select his disciples, to teach publicly, and perform miracles. Among the notable incidents of his public career are, the changing water into wine at the marriage in Cana of Galilee (his first miracle); the driving of the traders out of the temple during the feast of the passover; the curing by a word a nobleman's son lying ill at Capernaum; his scornful reception as a preacher in the city of Nazareth on account of his humble parentage; the calling of the twelve apostles; the sermon on the mount; the healing of the centurion's servant and the restoration of the widow's son at Nain to life; the healing of the man at the pool of Bethesda; the miraculous feeding of 5000 persons with five loaves and two fishes; the calming of the tempest on the lake of Gennesaret; his healing the Syrophenician woman's daughter of an unclean spirit; the transfiguration on the mountain; the raising of Lazarus at Bethany; the cure of blind Bartimæus at Jericho; the entry with triumph into

Jerusalem; the fourth feast of the pass-over with his disciples, known as the Last Supper; the agony in the garden of Gethsemane; the betrayal and the condemnation before the sanhedrim; the trial before Pilate, and the crucifixion on Golgotha or Mount Calvary. The body of Jesus was taken down from the cross by Joseph of Arimathea, and placed in a tomb about which the Jewish priests set a guard. But on the third day, i.e., on the day thence called the Lord's day and made first day of the week, he rose from the dead, appeared to his disciples and others, and on the fortieth day after his resurrection, while with his disciples on the Mount of Olives, was visibly taken up into heaven. These events of his public life are generally considered to have occupied three years.

JET, a solid, dry, black, inflammable fossil substance, harder than asphalt, susceptible of a good polish, and glossy in its fracture, which is conchoidal or undulating. In Great Britain it is found chiefly at Whitby in beds of the Upper Lias shale. It is the altered fossilized wood of coniferous trees. It is wrought into buttons and personal ornaments of various kinds.

JET'SAM, or **JETTISON**, goods thrown overboard from a ship in danger. See **Flotsam**.

JETTY, a kind of pier or artificial projection of stone, brick, wood, or other material, affording a convenient place for landing from and discharging vessels or boats, or serving as a protection from the violence of the waves; or a jetty may be built out from the bank of a stream obliquely to its course, and employed either to direct a current on an obstruction to be removed, as a bed of sand or gravel, or to deflect it from the bank which it tends to undermine or otherwise injure. In this last sense jetties have been successfully used to deepen river mouths or retard the advance of a bar, as at the mouths of the Mississippi, the Maas, the Danube, the Vistula, and other rivers. Many harbors, such as Calais, Ostend, etc., depend on jetties for their existence.

JEW, The Wandering, a legendary personage regarding whom there are several traditions. One of the most common is that he was a cobbler in Jerusalem by name Ahasuerus, at whose house Jesus, overcome with the weight of the cross, stopped to rest, but who drove him away with curses. Jesus is said to have replied, "Truly, I go away and that quickly; but tarry thou till I come." Since then, driven by fear and remorse, the Jew has wandered, according to the command of the Lord, from place to place, and has never yet been able to find a grave. The legend has been made use of by Shelley, Lewis, Croly, and Mrs. Norton in England, Schubart and Schlegel in Germany, and Sue in France.

JEWS, a Semitic race of people also known as Hebrews, and Israelites, and whose early history is identified with that of Palestine or the Holy Land. The main authority for the early history of this people is the Old Testament. But the chronology is obscure and difficult to harmonize. Jewish history may be considered as beginning with the emigration of the patriarch Abraham, ances-

tor of the race, from Ur of the Chaldees, probably about 2000 B.C. Abraham removed to the southeast of Palestine, where we find his descendants flourishing when they were led to emigrate to Goshen, in Egypt. The interval is filled up with the history of the patriarchs, Abraham, Isaac, and Jacob. Joseph, a son of Jacob had become viceroy of Egypt, and his father and brothers were received with high favor by the Pharaoh who then ruled in this country. But in course of time the condition of the Israelites, under the rule of the Pharaohs, changed for the worse. They were treated as bondmen, and forced labor exacted of them in an unreasonable degree. According to some authorities the Pharaoh who began to oppress the Israelites was Rameses II., and their deliverance took place under his son. It was perhaps about 1320 B.C., others say 1491, B.C., that a deliverer in the person of Moses led the Israelites out of the land of bondage, where they resided for some 400 years. By this time they formed a community of several millions, divided into twelve tribes, named respectively after Reuben, Simeon, Judah, Issachar, Zebulun, Benjamin, Dan, Naphtali, Gad and Asher, sons of Jacob, and Manasseh and Ephraim, sons of Joseph. Under his leadership they went forth into the wilderness; through him they received the law of the ten commandments on Mount Sinai, and the whole polity by which they were to be governed as a people. A ceremonial of sacrifice was instituted, and Aaron, the elder brother of Moses, and his sons consecrated as a hereditary priesthood, the priestly functions thus falling to the tribe of Levi. The nation was established as a theocracy, and this principle, however often forgotten in times of repose, continued henceforward to be the inspiring idea of national unity throughout the frequent crises of Jewish history. The emigrants first settled at Kadesh on the southern borders of Palestine, where they remained for many years, this being the period spoken of in the scriptures as the forty years' wandering in the wilderness. They now marched northward to find new settlements in Palestine, which they had to wrest by force from the Canaanites. Moses died before entering the promised land, and was succeeded as leader by Joshua, under whom the Israelites advanced to the conquest of the territories of the Canaanites west of Jordan. The former inhabitants, however, were not entirely subjugated, but retained possession of a number of cities, and the twelve tribes settled in districts which were more or less cut off from one another, and which formed an exceedingly loose union of small states under tribal chiefs, at times hard pressed by neighboring peoples. It was only long after, and by a gradual process of absorption, that the Canaanite territories and their inhabitants became amalgamated with the Israelites.

After the death of Joshua, about 1220, or according to another chronology 1427 B.C., a succession of judges or military leaders arose. Among the more remarkable of these judges were Barak, Deborah the prophetess, Gideon, Jephthah, Samson, and Samuel. About 1070 the

Philistines, who inhabited the coast and the low-lying plains west of the mountains of Judah, had defeated the Israelites and subjugated part of the country when Samuel, the "last judge in Israel," was inspired to declare to Saul, a Benjamite, his destiny to become king, and anointed him as such. Saul soon proved his fitness for the post by his successful leadership of the Israelites, and he continued to organize the forces of Israel, and to fight with varying success against their enemies till his disastrous defeat and death at Mount Gilboa, after which the power of the Philistines again predominated on the west side of Jordan. On the other side of the river the military skill of Abner still preserved a kingdom for Saul's son, Ishbosheth, and gradually reasserted with some success his authority in Ephraim and Benjamin. But in Judah, David, a native of Bethlehem, a warrior whom Saul's jealousy had driven into exile and alliance with the Philistines, and who had previously been anointed king in place of Saul, established a separate principality, the capital of which was at Hebron. For several years a hot war was waged between the two Hebrew states, and ended only with the murder of Abner and Ishbosheth, when all the tribes acknowledged David as king. David now transferred his residence from Hebron to Jebus, a fortified city which he wrested from the Canaanites, and called the city of David, afterward Jerusalem. He assailed and subdued the Philistines, Moabites, Edomites, Ammonites, and other surrounding nations, till all the country from the n.e. end of the Red Sea to Damascus acknowledged his authority. To this prosperous kingdom succeeded his son Solomon (B.C. 993, or by the long chronology 1015). His reign, owing to the warlike reputation which the nation had acquired under David, was entirely peaceful. He had no military tendencies, but he took great pains to arrange the administration of the kingdom in an orderly way, and his wisdom as a ruler and judge became proverbial. His alliances with Tyre and Egypt enabled him to carry on an extensive and lucrative commerce. He built the celebrated temple in Jerusalem, and extended and improved the city. His harem contained 700 wives that were princesses, besides 300 concubines. But with these, and with the extended commerce of the kingdom, it was inevitable that foreign elements should be introduced into the Jewish national life. Thus Solomon erected altars for the deities and the worship of the Moabites, the Ammonites, the Sidonians, and other nations; and the severe simplicity of old Hebrew manners gave place to luxury and craft.

The splendor of Solomon's reign had entailed heavy exactions upon his people. When Rehoboam, Solomon's son, succeeded, they came with Jeroboam at their head and demanded that he should make their yoke lighter. Rehoboam answered scornfully, whereupon ten tribes revolted and set up Jeroboam as king of a separate kingdom of Israel, with its capital first at Sichem, later at Samaria. Judah, along with a part of Benjamin and the tribe of the Levites, remained loyal to the dynasty of David.

After an unsuccessful attempt to reconquer the kingdom of Israel, Rehoboam was forced by an invasion of Shishak of Egypt to give up the hope of uniting the two kingdoms. In the next generation things had changed so much that Asa, king of Judah, was obliged to seek the help of Benhadad of Syria against King Baasha of Israel. Baasha was succeeded by Elah, Elah by Zimri, and Zimri by Omri, under whom the kingdom of Israel seems to have grown powerful. Omri established the capital of the kingdom at Samaria (about 906 B.C.), and subjugated the Moabites. The son of Omri, Ahab, married Jezebel, princess of Tyre, an event which led to the extension of Phœnician idolatry in Israel. As Solomon had done before, Ahab built a temple for the Syrian Baal in his capital. In his reign and subsequently the great prophets Elijah and Elisha played an important part. Ahab was slain at Ramoth-Gilead in battle against the Syrians. He was succeeded by Ahaziah (853-851), and Joram (851-843). The latter was slain by Jehu, a captain of the army, who had been anointed king by command of Elisha. Jehu (843-815) now made a clearance in Samaria of Syrian idolatries, destroying the temple of Baal and putting the priests to death. Under Jeroboam II., fourth in the line of Jehu, the kingdom reached a high point of prosperity (790-749). After Jeroboam's death there was a quick succession of kings, Zachariah, Shallum, Menahem, Pekaniah, Pekah; none of any significance. Under Pekah the kingdom of Israel became tributary to the Assyrians. (See Assyria.) Hosea, Pekah's successor, made an ineffectual attempt to free the country from the Assyrian yoke; but finally, in 722, Samaria was captured by the Assyrian king, Sargon, the kingdom of Israel virtually destroyed, and the chief inhabitants carried away and settled in Assyria and Media.

Generally while the kingdom of Israel had been flourishing, that of Judah had stood in the background. Rehoboam was succeeded by Abijam, Asa, Jehoshaphat, the last a powerful and fortunate king. In the hope of putting an end to the war with the kingdom of Israel, Jehoshaphat married his son Jehoram (848-844) to Athaliah, the daughter of Ahab of Israel. After the murder of her son Ahaziah by Jehu, Athaliah seized the supreme power in Jerusalem, and put to death her own grandchildren in order to destroy the line of David, Joash alone being miraculously rescued. Athaliah was overthrown and put to death and the young Joash raised to the throne (837-797). His successors were: Amaziah (797-792), Uzziah (792-740), Jotham, Ahaz, and Hezekiah (727-699). Under Ahaz and Hezekiah Isaiah delivered his sublime prophecies. Hezekiah was one of the greatest reforming kings; his influence extended widely over the kingdom of Israel, now in extreme decline. He was miraculously delivered from an invasion of Sennacherib, king of Assyria, by the destruction of the Assyrian army. (See Assyria.) Josiah (641-610) was the last of the pious kings of Judah. He was killed in battle against Necho, king of Egypt. After him there was an un-

interrupted succession of weak and incapable monarchs, till under Zedekiah (599-588) the capture of Jerusalem by Nebuchadnezzar, B.C. 588, put an end to the monarchy, Jerusalem being destroyed and many of the people being carried captive to Babylon. The prophet Jeremiah flourished from the reign of Josiah to the captivity.

In 538 Babylon was taken by Cyrus, king of Persia, who restored the Jews and appointed Zerubbabel, governor of Judæa, as a Persian province. The great majority of the Jews remained in Persia, however, only about 42,000 returned, and settled chiefly in the vicinity of Jerusalem. About 458 a second return of exiles was led from Persia by Ezra. Along with Nehemiah, who had been appointed Persian governor of Judæa, Ezra promulgated the new law-book, practically identical with the Pentateuch. From the time of Nehemiah to the fall of the Persian empire the Jews continued to live in peace as Persian subjects, but enjoying their own institutions. When Alexander the Great overthrew the Persian empire the Jews readily submitted on being promised the free exercise of their religion (B.C. 332). After the division of Alexander's empire Palestine was long a possession of the Ptolemies of Egypt, under whom it enjoyed a period of tranquility. It was under the patronage of Ptolemy (II.) Philadelphus (reigned B.C. 285-247), according to tradition, that the Septagint or Greek version of the Old Testament scriptures was made. After the death of Ptolemy Philopator Antiochus the Great of Syria became master of Palestine (B.C. 198). An Egyptian and a Syrian party now arose among the Jews, and gave occasion to civil dissensions, which led Antiochus IV. (Epiphanes) to invade Judæa (B.C. 170), when he took Jerusalem by storm and slaughtered the inhabitants without distinction of age or sex, and endeavored to compel the Jews to give up their religion. At length under the leadership of the Maccabees or Asmonean family resistance arose, and after a struggle of nearly fourteen years was successful. In 135 B.C. John Hyrcanus, son of Simon, a brother of Judas Maccabæus, completed the independence of Judæa, and extended his dominion over the ancient limits of the Holy Land. During his reign the rival sects of the Pharisees and Sadducees became established. Aristobulus I., the son of Hyrcanus, assumed the title of king, which was held by his successors. In B.C. 63 Pompey, called in to help the Pharisees, took Jerusalem, and made the Jews tributary to the Romans. Latterly Herod the Great, who entirely threw off Jewish manners and cultivated the favor of the Romans, was recognized as King of Judæa by the Roman senate. It was in B.C. 4, the last year of his reign, that the birth of Christ took place at Bethlehem. In 6 A.D. Judæa and Samaria became a Roman province under a procurator, who had his seat at Cæsarea, and was subordinate to the prefect of Syria. Pontius Pilate, under whom our Lord's public ministry and crucifixion occurred, was made procurator A.D. 26. For a time the country was again ruled by a king, Herod

Agrippa, A.D. 41-44. He persecuted the Christians and put the Apostle James to death. In A.D. 65 a party of the Jews revolted from the Roman yoke and roused the whole of Palestine to insurrection. Vespasian was sent by Nero to suppress it, but before the war was finished was called to the empire and left his son Titus to conclude it. The result was the capture and destruction of Jerusalem, A.D. 70, an event that deprived the Jews of the center of unity to which their national life had hitherto clung. After an insurrection headed by Bar-Cochba, 132-135, Hadrian razed the remains of Jerusalem left by Titus to the ground, and erected in their place a Gentile city, with the title *Ælia Capitolina*. Jews were forbidden to enter this city on pain of death, and the name of Jerusalem was not revived till the time of Constantine.

Henceforth the Jews became more and more a scattered people, without a country they could call their own. Under the Roman emperors their treatment varied. Under the Emperor Julian they ventured to make preparations for a new temple in Jerusalem. Although this attempt failed, they derived great advantages from their sanhedrim, revived at Tiberias, and their patriarchates (presidencies of the sanhedrim), which were established—one at Tiberias for the western Jews (429); the other for the Jews beyond the Euphrates, latterly at Bagdad. These two patriarchates became points of union, and flourishing Jewish academies arose in the east to serve as seminaries for their learned rabbins. One of the works of these scholars was the collection of the traditional expositions of the Old Testament, and additions to it, which was completed A.D. 500, and received, under the name of the Talmud, as a rule of faith by the scattered communities of Jews. In time the scattered Jews made themselves masters of the commerce of of the Old World, and, as money-lenders and brokers, were often of great importance to princes and nobles. Even during the dreadful persecutions which they underwent from the cruelty of the Christians they still continued prosperous in Christian countries. They lived more happily, however, among the Mohammedans, although they were distinguished by dishonorable badges and oppressed by heavy taxes; and during the Moorish supremacy in Spain their prosperity was great and their learning flourishing. In the cities of France, Germany, and Italy, after the 11th century, particular streets and inclosed places were assigned to them as a sort of outcast, in consequence of which, in the persecutions during the crusades, thousands often fell victims at once to the popular fury. They were generally pronounced incapable of civil rights and public offices. In Spain and Portugal during the 15th century they yielded to force, and multitudes suffered themselves to be baptized, many were put to death by the inquisition, and at last they were banished from the peninsula. It was only in the end of the 18th century that the Jews began to be put on a level with other citizens, France leading the way after the revolu-

tion, and Prussia following (1811). After repeated unsuccessful attempts to procure their admission into the British parliament, the object was at last effected in 1858. The most remarkable circumstances connected with the modern Jews is the tenacity with which they cling to their ancient religion, and the purity in which on the whole they have retained their racial characteristics in the midst of alien peoples. In modern times they have produced some of the greatest names in letters and arts, as Spinoza, Moses Mendelssohn, Heinrich Heine, Meyerbeer, etc. The total number of Jews throughout the world is estimated at 8,000,000, the greater number being in Russia and Austria-Hungary.

JEWETT, Charles Coffin, American librarian, was born in Lebanon, Me., in 1816. He became librarian at Brown university in 1841 and from 1843 to 1848 was professor of modern languages. He then became librarian of the Smithsonian institution and from 1855 to 1868 was superintendent of the Boston public library. He was the first of the modern school of librarians. At Boston he prepared the card catalogue, one of the first instances of the use of the card catalogue in public libraries. He died in 1868.

JEWETT, Sarah Orme, American author; was born in South Berwick, Me., in 1849. Her best known works are *Country By-ways*, *A Country Doctor*, *Deep Haven*, *The King of Folly Island*, and *Other People*. Most of her works consists of short stories noted for their sympathetic portrayal of New England life.

JEW'S-HARP, a toy musical instrument held between the teeth, which



Jew's-harp.

gives a sound by the motion of a tongue of steel, which, being struck by the hand, plays against the breath.

JHALAWAR, Indian native state in Rajputana; area, 3043 sq. miles; pop 343,601. Capital, Jhalra Patan, or Patan; pop. 12,000.

JHANG, town of Hindustan, in the Punjab, about 3 miles from the Chenab. Pop. (with adjoining Maghiana), 24,382. —Jhang district has an area of 5871 sq. miles; pop. 436,841.

JHANSI (jhān'sē), a fortified town in Hindustan, in Gwalior state, Central India. Pop. 55,724.

JIB, a triangular fore-and-aft sail extended on a stay stretching from a bowsprit or jib boom to a mast, the jib boom being a continuation of the bowsprit by a spar run out from the extremity of it.

JIG, a light quick tune or air in $\frac{3}{4}$, $\frac{3}{8}$, $\frac{4}{4}$, $\frac{2}{4}$, $\frac{2}{2}$, or $\frac{1}{2}$ time, to be found in the sonatas of suites of Corelli, Handel, and other composers till toward the middle of the 18th century. The Irish jig, played to a dance also called a jig, is a lively tune of two or three sections written in $\frac{3}{4}$ time.

JINGOISM, during the winter of 1877-78, when England was undecided to interfere forcibly in the war between Prussia and Turkey the excitement in London became intense, and the fighting spirit found vent in a doggerel:

"We don't want to fight, but by Jingo, if we do,
We've got the ships, we've got the men, we've
got the money too."

The term, corresponding to "spread-eagleism" in America, has ever since been applied to the warlike advocates of British imperial sway, and has been taken up with the same meaning in the United States.

JINN, Jinnee being the singular, in Mohammedan mythology, a race of genii, angels, or demons, fabled to have been created several thousand years before Adam. They are not immortal; they are to survive mankind, but to die before the general resurrection. Some are good and obedient to the will of God; others are disobedient and malignant. They can assume the shape of the lower animals, and are visible or invisible as they please. Their chief residence is the mountain Kâf in Arabia.

JIT'OMIR, a town of Russia, capital of the government of Volhynia, on the left bank of the Teterew, 80 miles w. of Kiev. Pop. 55,875.

JOACHIM (yō'a-kēm), Joseph, Hungarian violinist, was born at Kittsu, near Pressburg, Hungary, in 1831. When only seven years old he made his first public appearance at Budapest. In 1844 he visited England and was enthusiastically received. He was appointed concert meister in 1849 of the orchestra at Weimar. In 1854 he accepted the post of concert conductor and solo violinist at the court of Hanover. In 1868 he was appointed head of the hoch schule für ausübende tonkunst. His most important work is the Hungarian concerto in D minor. He is best known as the greatest master of style, repose and tone of his day and generation. He died in 1907.

JOAN, the female pope, according to a story long believed, but now acknowledged to be a fiction, was said to have been a native of Mainz, who, falling in love with an Englishman at Fulda, traveled with him in man's attire, studied at Athens, and visited Rome. Under the name of Johannes Anglicus, she rose by her talents from the station of a notary till she was elected to the papal chair under the name of John VIII. (854 to 856, between Leo IV. and Benedict III.). She governed well, but having become pregnant she was delivered in a solemn procession, and died on the spot.

JOAN OF ARC, the Maid of Orleans, a heroine in French and English history, was born in the village of Domrémy, Basse Lorraine, now department of the Vosges, in 1409 (some say 1412). While she was still a girl she began to be deeply affected by the woes of her country, much of which was conquered by the English, leaving only a small portion to the French king, Charles VII. In 1427 Orleans was being besieged by the English, and its fall would have ruined the cause of Charles. At this time Joan, who had been noted for her solitary meditations and pious enthusiasm, began, as

she declared, to see visions and hear angelic voices, which ultimately called upon her to take up arms for Charles; to raise the siege of Orleans, and conduct Charles to Rheims to be crowned. At first she was regarded as insane, but eventually she found her way to the king and his councillors, and having persuaded them of her sincerity, received permission to hasten with Dunois to the deliverance of Orleans. In a male dress, fully armed, she bore the sword and the sacred banner, as the signal of victory, at the head of the army. The first enterprise was successful. With 10,000 men she marched from Blois, and on the 29th April, 1429, entered Orleans with supplies. By bold sallies, to which she animated the besieged, the English were forced from their entrenchments, and Suffolk abandoned the siege (May 8, 1429). Other successes followed; Charles entered Rheims in triumph; and at the anointing and coronation of the king, July 17, Joan stood at his side.

She was wounded in the attack on Paris, where Bedford repulsed the French troops, but continued to take part in the war till May 25, 1430, when she was taken prisoner by the Burgundians, and sold to the English. She was taken to Rouen, and after a long trial, accompanied with many shameful circumstances, condemned to death by the church as a sorceress. On submitting to the church, however, and declaring her revelations to be the work of Satan, her punishment was commuted to perpetual imprisonment. But pretenses were soon found to treat her as a relapsed criminal, and as such she was burned at Rouen, May 30, 1431, and her ashes were thrown into the Seine. She died with undaunted fortitude. Five years after, a court specially constituted by Pope Calixtus III. to examine the charges against the Maid of Orleans, pronounced her innocent. Voltaire, in a notorious burlesque, Southey, Schiller, and others have made her the subject of their verse. Schiller's drama still remains the worthiest monument of her fame.

JOB, the hero of an ancient Hebrew poem, which forms one of the books of the Old Testament. Job, an upright man, with a family of seven sons and three daughters, with large herds and numerous servants, is suddenly, with the permission of Jehovah and by the agency of Satan, deprived of his possessions and his children, and smitten with a sore disease, yet submits patiently to the divine will. Three friends come to console him, and a large part of the poem is occupied with the speeches of his friends, who attribute his misfortunes to wickedness and hypocrisy, and his replies to them, until near the close, when God himself is introduced answering Job out of a whirlwind. In the sequel Job is delivered from his calamities, lives 140 years, becomes richer than he had been before, and begets seven sons and three daughters. The design of the book seems to be to enlarge men's views of the providence of God. It was probably written between the 7th and the 5th centuries B.C., and is certainly not earlier than the time of David. The basis of the story was probably traditional.

JODHPUR (jöd-pör'), a town of Hindustan, capital of the state of Jodhpur. Pop. 60,437.—The state of Jodhpur or Marwar is the largest in Rajputana, having an area of 37,445 sq. miles. Pop. 2,521,727.

JOE MILLER, the name attached to a well-known collection of jests, first published in 1739. The name belonged to a comic actor, who had then a great reputation at a wit and humorist. The real compiler, however, was a John Mottley, an obscure author who died in 1750.

JOHAN NESBURG, a town in the Transvaal, recognized as the central point of the goldfields of the district stretching southwest from Pretoria to Potchefstroom, and known as the Witwatersrand. The South African war temporarily almost ruined the place. Estimated pop. over 70,000.

JOHN, one of the apostles, often distinguished as St. John the Evangelist, the reputed author of the fourth gospel, three epistles, and the Revelation, was the son of Zebedee and Salome, and the brother of James. Previous to his call by Jesus he was a fisherman on the Sea of Galilee, together with his father, his brother, and Simon Peter and Andrew, who were his partners. John, together with Peter and James, was admitted to a more confidential intercourse with Jesus than the other apostles, and he is repeatedly spoken of as "the disciple whom Jesus loved." His gospel was written later than any of the others—according to some critics to refute particular heresies, and contains fuller details of our Lord's conversations and discourses than the other gospels, and is also more doctrinal in character. Of the three epistles the first had much resemblance to the gospel; but the other two were considered doubtful even by the early fathers. After the death of Jesus, John continued at Jerusalem, and we afterward find him at Samaria (Acts iii. 1425). Tradition handed down by the fathers make him die at Ephesus, and if he wrote the Revelation he must have been banished to Patmos. The time of his death is unknown.

JOHN, called the Baptist, the forerunner of Christ, was born six months before Jesus (their mothers were cousins), of a Levitical family in Judæa. He lived an austere life, given up to solitary meditations, till A.D. 26, when he began to preach in the deserts of Judæa, announcing that the kingdom of heaven was at hand, and proclaiming himself the harbinger of the Messiah. He baptized many converts, and testified to the higher mission of Jesus at the time of his baptism in the Jordan. To gratify a vindictive woman Herod Antipas, tetrarch of Galilee, caused him to be beheaded in prison.

JOHN, the name of twenty three popes, among whom are the following:—John I. (St. John), pope in 523–526. Theodoric sent him to Constantinople, to induce the Emperor Justin to adopt milder measures toward the Arians, and on his returning without success Theodoric threw him into prison, where he died.—John XII. succeeded Pope Agapetus II. in 956, when only eighteen years old. He was the first pope who changed his name on his accession to the papal

dignity. His life was so licentious and disorderly that the Emperor Otho had him deposed by a council in 963, and Leo VIII. elected in his stead. But on Otho's departure John returned to the city with a strong body of followers and drove out Leo. He died in 964.—John XXII., a native of Cahors, was elected pope at Lyons in 1316, after the death of Clement V. He resided at Avignon, and took an active part in the disputes of the emperors Louis of Bavaria and Frederick of Austria. He died in 1334.—John XXIII. (Balthasar Cossa), born in Naples, was a pirate in his youth, afterward studied at Bologna, and was elected pope in 1410, by the council of Pisa, after the death of Alexander V., on condition that, if Gregory XII. and Benedict XIII. would resign, he would also retire to end the schism. He summoned the council of Constance, demanded by the Emperor Sigismund, in 1415, and was deposed by this council as guilty of a long list of heinous crimes. For some years he remained in custody, but was ultimately pardoned by Pope Martin V., and made a cardinal. He died in 1419.

JOHN, King of England, born in 1166, was the youngest son of Henry II., by Eleanor of Guienne. He obtained the crown on the death of Richard in 1199, although the French provinces of Anjou, Touraine, and Maine declared for his nephew, Arthur of Brittany, who was lineally the rightful heir, then with the King of France. In 1205 his great quarrel with the pope began regarding the election to the see of Canterbury, to which the pope had nominated Stephen Langton. The result was that Innocent III. laid the whole kingdom under an interdict, and in 1211 issued a bull deposing John. Philip of France was commissioned to execute the decree, and was already preparing an expedition when John made abject submission to the pope, even agreeing to hold his kingdom as a vassal of the pope (1213). John's arbitrary proceedings led to a rising of his nobles, and he was compelled to sign the Magna Charta or Great Charter, June 15, 1215. But John did not mean to keep the agreement, and obtaining a bull from the pope annulling the charter, he raised an army of mercenaries, and commenced war. The barons, in despair, offered the crown of England to the dauphin Louis, who accordingly landed at Sandwich, 30th May, 1216, and was received as lawful sovereign. The issue was still doubtful when John was taken ill and died at Newark, October, 1216, in the forty-ninth year of his age.

JOHN II., King of France (1319–64). In 1356 he was defeated and taken prisoner by the Black Prince at the battle of Poitiers, and was detained at Bordeaux and at London, where he died in 1364.

JOHN III. (Sobieski), King of Poland, was born at Olesko, in Galicia, in 1624, served in the French army, returned to Poland to repel the Russians in 1648, and greatly distinguished himself in several campaigns against Cossacks, Tartars, and Turks, especially by his defeat of the last in the great battle of Choczim, in 1673. The year after, on the death of Michael Corybut, he was chosen

king. His most celebrated achievement was the relief of Vienna, besieged by a great army of Turks, whom he decisively defeated 12th Sept. 1683. He died 17th June, 1696.

JOHN BROWN'S BODY, one of the marching songs of the war. The melody was heard in a southern colored church and fitted to the words of Say, Brothers, Will you Meet Us?

JOHN BULL, a name first used by Dr. Arbuthnot, and since popularized as a typical name suggesting a humorous or burlesque representation of the English character. He is represented as a bluff, jolly, bull-headed farmer.

JOHN, Knights of St., or Knights Hospitallers of St. John, afterward called Knights of Rhodes, and finally Knights of Malta, were a celebrated military religious order, originating in a monastery founded at Jerusalem in 1048 by some merchants from Amalfi. The monastery was dedicated to St. John the Baptist, and the monks, who were called Brothers of St. John or Hospitallers, had the duty of caring for the poor and sick, and in general of assisting pilgrims. In 1118 the order was regularly instituted as a military order, with the duty, in addition to their vows of



Knight of St. John.

chastity, obedience, and poverty, of defending the church against infidels. The brethren were divided into three classes, knights, chaplains, and serving brothers, these last having specially the duties of looking after the sick, and accompanying pilgrims. In 1291 the order was driven from Palestine by the conquests of the Saracens, and after holding Cyprus for a time they occupied Rhodes in 1309, from which they were ultimately driven by Sultan Soliman II in 1522. After that the knights retired to Candia and other places, but finally to Malta, which Charles V. granted them in 1530. In peace they wore a long black mantle and a gold cross of eight points, enameled white; in war they wore a red jacket or tabard, charged with a white cross. In 1798 Malta was unexpectedly attacked and taken by Bonaparte, and about the same time the extensive properties belonging to the order in various countries were confiscated. This may be considered the end of the order as a vital institution, although shortly after the capture of Malta, Paul I., who had been chosen grand-master, took the order under his protection, and it still exists nominally at least. After the

death of Paul the nomination of the head of the order, was vested in the pope.

JOHN OF AUSTRIA, commonly called Don John of Austria, the natural son of the emperor Charles V., was born at Ratisbon in 1545. In 1570 he conducted a campaign against the recalcitrant Moors of Granada with great vigor and relentlessness, and in the following year he commanded the allied fleet which won the great naval battle of Lepanto over the Turks (7th Oct., 1571). In 1576 he was appointed governor of the Netherlands, and had just won along with the Prince of Parma the victory of Gemblours (1578) over William the Silent, when he died, not without suspicion of having been poisoned by his jealous half-brother, Philip II.

JOHN OF GAUNT, a corruption of Ghent, where he was born in 1340, was fourth son of Edward III. and his queen Philippa, daughter of the Earl of Hainaut. He was created Duke of Lancaster, in 1362; served in the French wars, and became governor of Guienne. He assumed in right of his wife the title of King of Castile, invaded the kingdom to assert his claims, but subsequently relinquished them in favor of Prince Henry of Castile, who had become his son-in-law. His eldest son Bolingbroke became king of England as Henry IV. He died 3d February, 1399.

JOHNS HOPKINS UNIVERSITY, one of the foremost universities of the United States, in Baltimore, Maryland, endowed by Johns Hopkins, a merchant of Baltimore, with more than \$3,000,000 and opened in 1876. Besides the library there are well-equipped laboratories for chemistry, biology, etc. There is an extensive teaching staff, and instruction is given to two grades of students, graduates and undergraduates. The former are such as have taken a degree here (that of B.A.) or elsewhere, and wish to carry their studies further. This university gives special attention to advanced studies of various kinds, as well as to original research. A number of periodicals are issued in connection with the university. There are, besides numerous scholarships, about twenty fellowships, each of the value of \$500 annually. A hospital, also endowed by Johns Hopkins, is connected with this institution.

JOHNSON, Andrew, 17th president of the United States, born in North Carolina, 1808, died 1875. He was self-



Andrew Johnson.

educated; entered congress as a democrat in 1843, and the senate in 1857. On Lincoln's election he became vice-president, and thus became president upon the assassination of Lincoln in

April, 1865. During his term of office he was in constant conflict with the senate, and was impeached by the house of representatives of high crimes and misdemeanors (Feb. 1868), the trial ending in a technical acquittal. A general amnesty to the rebels was his last presidential act.

JOHNSON, Reverdy, American jurist, born at Annapolis, Md., in 1796. In 1817 he removed to Baltimore, and was successively deputy attorney-general of Maryland and for four years a state senator. He represented his native state in the United States senate from 1845 to 1849, when he resigned his seat to enter President Taylor's cabinet as attorney-general. In 1863 he was again elected to the United States senate, but before the expiration of his term was appointed minister to England in 1868. He died in 1876.

JOHNSON, Richard Mentor, American soldier, was born in Kentucky in 1781; he entered the state legislature in 1804, and three years later was elected to congress as a republican. He sat in congress for twelve years, but during the war with Great Britain left his legislative duties to assist in the campaign. He took part in the engagement at Chatham, Ontario, and at the battle of the Thames, October 5, 1814, killed an Indian chief, and was himself severely wounded. From 1819 to 1829 Mr. Johnson served in the United States senate, and from 1829 to 1837 again in the lower house of congress. He was a candidate for vice-president on the ticket with Van Buren in 1836, failed to obtain a majority of the electoral votes, but was chosen by congress. He was a member of the legislature of Kentucky at the time of his death in 1850.

JOHNSON, Rossiter, American author, was born in Rochester, in 1840; was graduated at the University of Rochester in 1863. From 1864 until 1868 he was co-editor of the Rochester Democrat, a republican newspaper, and from 1869 until 1872 edited the Concord (N. H.) Statesman. From 1873 until 1877 he was one of the editors of the American Cyclopædia, and in 1879-80 assisted Mr. Sidney H. Gay in preparing the last two volumes of the so-called Bryant's History of the United States. In 1883-1890 he was editor of the Annual Cyclopædia. His original publications include Idler and Poet, A History of the French War, A History of the War Between the United States and Great Britain and a History of the United States.

JOHNSON, Dr. Samuel, eminent English author, was born at Lichfield 1709, died at London, 1784. Rasselas (1759), written in a week to pay for his mother's funeral, is one of the most interesting and characteristic of his works. For eighty years from 1747 Johnson's attention was chiefly engaged by his Dictionary of the English Language, a work which appeared in 1755, and is highly honorable to the author in the circumstances in which it was produced, but is of little real philological value. In 1765 appeared his long-promised edition of Shakespeare. In 1773 Johnson made a tour to the Hebrides in company with his friend Boswell, of which he gives a

highly instructive account in his Journey to the Western Isles of Scotland. In 1775 he received the diploma of D.C.L. from the University of Oxford, and soon after visited France in company with the Thrales. His last literary



Samuel Johnson.

undertaking was his Lives of the Poets, which was completed in 1781. He was buried in Westminster Abbey. Boswell's Life may be said to convey a more favorable impression of Johnson's real strength, both in thought and language, than anything in the works which he wrote and published.

JOHNSTON, Albert Sidney, American soldier, was born in Kentucky in 1803. After graduating at West Point in 1826 he served for eight years in the United States army, emigrated to Texas in 1834, and entered the Texan service as private in 1836. His promotion was so rapid that in 1838 he was appointed commander-in-chief, and till 1840 acted as secretary of war. From 1840 till 1846 he lived in retirement on his farm in Texas; but in the latter year he accepted the colonelcy of a regiment of Texan volunteers to serve against Mexico. As a staff-officer he was present at the battle of Monterey in September, 1846. Texas joined the Union in 1846; and in 1849



A. S. Johnston.

Johnston received a major's commission in the United States army. After various services he won the rank of brevet brigadier-general by his skilful conduct of the expedition sent to Utah in 1857 to bring the Mormons to order. In January, 1861, he was transferred from the command of the Texas department to that of the Pacific department; but in April he was superseded, probably on account of his secessionist sympathies. He resigned his national commission in May, 1861, and accepted a command in the confederate army. While acting as commander-in-chief at the battle of Shiloh, he was killed, April 6, 1862.

JOHNSTON, Joseph Eccleston, American soldier, was born in Prince Edward co., Va., in 1807. He graduated at the

military academy at West Point in 1829, and served in various military capacities, chiefly in the topographical engineers, until the outbreak of the civil war, at which time he was made quartermaster-general, with the rank of brigadier-general. He resigned his commission April 22, 1861, and entered the confederate service as major-general. During the earlier part of the campaign of 1862 he was in command of all the confederate forces in Virginia, and was severely wounded at the battle of Fair Oaks, near Richmond, May 31st. In November, having been made lieutenant-general, he was assigned to the command of the military department of Tennessee, and in the following spring made an ineffectual effort to relieve Vicksburg, on the Mississippi, which was then besieged by General Grant.



J. E. Johnston.

After the defeat of General Bragg, at Chattanooga, November 25, 1863, Johnston was assigned to the command of all the confederate forces in the southwest, with the rank of general. In 1864 he was at the head of the forces which opposed Sherman in his famous "march to the sea." Having learned that Lee had surrendered the army of Virginia to Grant, Johnston capitulated to Sherman at Burham's station, N. C. In March, 1885, he was appointed commissioner of railroads by President Cleveland. He published a narrative of military operations conducted by him during the war between the states. He died March 21, 1891.

JOHNSTOWN, a town in Cambria co., Pennsylvania, situated on the Conemaugh river about 89 miles s.e. of Pittsburgh. It is the center of a flourishing manufacturing district, and the town and neighborhood in great part belong to the Cambria Iron co., who are said to employ some 5000 people in their iron-mills. In 1889 Johnstown and district was laid waste by the bursting of Conemaugh lake and reservoir, situated about 10 miles above the town. Houses, churches, and factories were driven by the flood into a mass of ruin, which was finally piled up against the railway bridge at Johnstown, and its destruction completed by the outbreak of fire. About 9000 people perished. Pop. 40,125.

JOHORE, a native state under British protection at the s. extremity of the Malay peninsula; area, 9000 sq. miles; pop. 200,000.

JOISTS, in carpentry, are the beams of timber to which the flooring of rooms and the laths of a ceiling are nailed, and which rest on the walls or girders, and sometimes on both. They are laid hori-

zontally, and in parallel equi-distant rows.

JOKAI (yō'ká-i), Mor, Hungarian novelist, born at Komorn 1825. His first novel, Working Days, was published in 1845, and since then he has produced about 200 volumes of romances and novels, dramatic poems, humorous essays, etc. Died in 1904.

JO'LIET, capital of Will co., Illinois, 37 miles s.w. of Chicago. It has an important state prison, large limestone quarries, and steel and iron works, etc. Pop. 32,650.

JOLIET, Louis, an explorer of the Mississippi valley, was born in Quebec in 1645. In 1672 Governor Frontenac and Talon made an effort to trace the course of the Mississippi river, which was then supposed to discharge itself into the Sea of California. Joliet was intrusted with this enterprise. He descended the Wisconsin and Illinois rivers, and on June 17, 1673, entered the Mississippi. After visiting several Indian villages on its banks, he became assured that the river emptied its waters into the Gulf of Mexico, and began his return journey. He reached Lake Winnipeg at the end of September, where he spent the winter at the mission of St. Francis Xavier, and in 1674 returned to Quebec. On the way Joliet lost his map and papers by the upsetting of his canoe in the Lachine rapids of the Niagara river. He was thereafter made governor of the colony, and was married. About 1680 he was granted Anticosti Island, where he built a fort, which was destroyed by the British, and his wife taken prisoner. Later Joliet explored Labrador, and on April 30, 1697, was granted the seignior of Joliet, near Quebec. He died in 1700.

JOLLY-BOAT, one of the smaller boats carried by a vessel, and used especially for communicating with the shore. See Boat.

JONAH, one of the minor prophets, son of Amittai, and according to 2 Kings xiv. 25, a contemporary of Jeroboam II., was born at Gath-Hepher, in Galilee. The book which bears his name is historical rather than prophetic, and the miraculous event of Jonah remaining three days and three nights in the belly of a fish has been regarded by some as an allegory. Orthodox theologians, however, are generally of opinion that the mention of it by Christ (Mat. xii. 39), obliges us to regard the event as really historical. Jonah's grave is shown at Mosul, the ancient Nineveh, and also at Gath.

JONES, John Paul, a commander in the American naval service, was born in Kirkcudbrightshire, Scotland, in 1747. His father, whose name was John Paul, was gardener to the Earl of Selkirk. He entered the merchant service, was engaged in the American and West Indian trade, and is said to have realized a handsome fortune. On the outbreak of war between the colonies and mother country he offered his services to the former, and in 1778, being then in command of the Ranger, he made a descent on Whitcaven, set fire to the shipping, and plundered the Earl of Selkirk's mansion. Next year, in command of the Bon Homme Richard (42 guns) and a

small squadron, he threatened Leith, and captured the British sloop of war Serapis after a bloody engagement off Flamborough Head. Jones, upon his arrival in Paris was presented by Louis XIV. with a gold mounted sword and was decorated with the Cross of the Order of Military Merit. Congress voted him a gold medal, passed a resolution commending his "zeal," prudence, and intrepidity," assigned him to



John Paul Jones

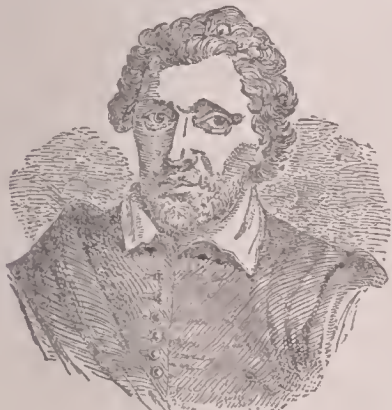
the command of a new ship of the line then building, and proposed to create for him the rank of rear-admiral. He also received a complimentary letter from General Washington. In 1788 entered the Russian service with the rank of rear-admiral, but owing to the jealousy of Russian commanders soon retired from this service. He returned to Paris, where he died in 1792. He was given a public funeral by the National Assembly. In 1906 his remains were brought to the United States in an American warship and buried with imposing ceremonies.

JONES, John Percival, American legislator and politician, born in Herefordshire, England, in 1830. He was brought to the United States in 1831 by his parents, who settled in northern Ohio. From 1863 to 1867 he was a member of the California state senate. In 1867 he removed to Nevada, and became superintendent and part owner of the famous "Crown Point" silvermine, the subsequent development of which brought him a large fortune. In 1873 he was elected by the Nevada legislature to succeed James Nye in the United States senate, and was reelected as a republican in 1879, 1885, and 1891, and as a "Silverite" in 1897. He favored the free coinage of silver without regard to the rest of the world, and on that issue left the republican party and supported Bryan in 1896. During the campaign of 1900 he returned to the republican party, though without giving up his free-silver theories.

JONES, Samuel Porter, commonly known as "Sam Jones," an evangelist of the Methodist Episcopal Church South. Was born in Chambers co., Ala., in 1847. He was converted in 1872 and

ordained the same year and at once began preaching. His success was remarkable and he became widely known. Many of his sermons have been published in his works, *Sermons and Sayings* by Sam Jones, *Quit Your Meanness*, *Sam Jones' Own Book*. He died in 1906.

JONSON, Ben or Benjamin, a celebrated English poet, the contemporary and friend of Shakespeare. We was born June 11, 1574, at Westminster. In 1599 he brought out his comedy of *Every Man out of his Humor*, which was followed by *Cynthia's Revels* (1600); the *Poetaster* (1602); *Sejanus*, a tragedy (1603). In 1605 his comedy of *Volpone* or the Fox appeared; in 1609 *Epicæne* or *The Silent Woman*; in 1610 the *Alchemist*; in 1611 *Catiline*, a tragedy; and in 1614 *Bartholomew Fair*, a complete picture of Elizabethan low life. In 1619 he received the honorary degree of A.M.



Ben Jonson.

from Oxford University, and on the death of the poet laureate was appointed his successor, and the salary raised to the sum of \$500 by Charles I. His latter days were spent, not perhaps in much pecuniary prosperity, but certainly in fame and honor, as the acknowledged chief of English literature. He died Aug. 6, 1637. He was buried in Westminster Abbey, where a monument was erected to his memory with the inscription, "O rare Ben Jonson." Jonson's best dramas are excellent in plot and development, have strongly conceived characters and excellent traits of humor.

JOPPA. See Jaffa.

JOPLIN, a city in Jasper co., Mo., on the Mo., St. L. and S. Fran., the K. C., Ft. S. and Mem., the K. C., Pitt, and Gulf, and the Mo. Pac. railways; 168 miles s. of Kansas City. It is the center of the Southwest Missouri lead and zinc district. Pop. 31,400.

JORDAN, David Starr, American educator, born at Gainesville, New York, in 1851. In 1872 he became an assistant to the United States Fish Commission, and began the study of fishes. He is one of the foremost ichthyologists in the world. From 1875 to 1879 he was professor of biology at Butler University, Indianapolis, Ind., and in the latter year was elected to the chair of zoölogy at the University of Indiana at Bloomington, of which he became president in 1885. In 1891, on the founding of Leland Stanford Junior University, he became its first president, and under his able supervision the institution was successfully organized. In 1897 he was a special United States commissioner

to investigate the fur-seal fisheries in Alaska.

JORDAN, the largest river in Palestine and one of the most celebrated rivers in the world. It rises from several sources, uniting in Bahr el-Huleh, or the Waters of Merom. From this point it flows with a rapid current in a narrow rocky bed and falls after a southerly course of about 10 miles into Lake Tiberias. Shortly after leaving the south end of this lake it enters a broad valley or ghor, called in the Bible "the plain;" and continuing a southerly but singularly crooked course of about 70 miles direct distance, or 200 including windings, falls into the north end of the Dead Sea, having received the Zerka or Jabbok, also on the left, and numerous smaller affluents. The upper part of the valley of the Jordan is hilly, arid, and barren, but it becomes more level and fertile as it approaches the Zerka. The valley of the Jordan forms one of the most remarkable depressions in the world, the Dead Sea being 1312 feet below sea-level, and the total fall of the river being about 2300 feet.

JOSEF'FY, Rafael, Hungarian-American pianist, composer, and teacher, born at Miskolez, Hungary, in 1853. He established himself in New York in 1880 and afterward came to be recognized as one of the leading teachers and concert virtuosos. He published upward of a score of piano compositions.

JOSEPH, one of the two sons of the patriarch Jacob by his favorite wife Rachel. His father's preference for him drew down the enmity of his elder brothers, who sold him to some Ishmaelitic slave-dealers, by whom he was sold to Potiphar, a distinguished officer in Egypt. The story of his elevation to the position of vice-regent of Egypt and the settlement of his father and brothers there is well known (Gen. xxxvii.-l.). Authorities still differ as to the period in Egyptian history to which Joseph's life belongs, some placing it before, others under, and others after the time of the Hyksos or shepherd kings.

JOSEPH, the husband of Mary the mother of Jesus, was a descendant of the house of David though resident at Nazareth, where he followed the trade of a carpenter. Early tradition represents him as an old man at the time of his marriage, and he seems to have died before the commencement of the public ministry of Jesus. His day in the Roman Catholic calendar is the 19th March.

JOSEPH I., Emperor of Germany, eldest son of Leopold I., born 1678; became emperor in 1705. He was a zealous member of the alliance against France in the war of the Spanish succession, in which the victories of Marlborough and Eugene won glory for the imperial arms. He died in 1711.

JOSEPH II., German emperor, son of Francis I. and Maria Theresa, was born March 13, 1741. He was elected king of the Romans in 1764, and on the death of his father, 1765, German emperor, succeeding his mother, however, in the hereditary estates of the House of Austria only in 1780. He at once commenced an extensive scheme of reforms, but the country was not prepared for

such sudden changes, and he was compelled to give up most of his plans. In 1788 he visited Catherine II. at Cherson, and in league with her made war against Turkey. He died in 1790.

JOSEPHINE (zho-sā-fën), Empress of the French, was born in Martinique June 24, 1763, being the daughter of Lieutenant Tascher de la Pagerie. She married in 1779 Vicomte Alexandre Beauharnais, by whom she had two children, Eugène and Hortense. In 1794 her husband, who had been commander of the army of the Rhine, was executed by order of the convention. She herself had a narrow escape, having been included in the list of proscription. After the fall of Robespierre she paid a visit to Napoleon to thank him for restoring the sword of her husband, and so pleased him that he soon after married her (1796). She became a beneficial element in his life, and her amiable manners won the hearts of everybody and helped to secure her husband's position. When Napoleon ascended the throne in 1804 she was crowned along with him. But the fact that the union was childless stood in the way of Napoleon's ambition to become the founder of a dynasty, and in 1809 Josephine was divorced, retiring to her beautiful seat of Malmaison, with the title of empress-queen-dowager and an annual grant of two million francs. She died May 29, 1814.

JOSEPHUS, Flavius, the historian of the Jews, was born at Jerusalem 37 A.D., and was carefully educated. In 64 A.D. he made a journey to Rome, and was introduced to Poppæa, the wife of Nero. On his return he found his countrymen preparing to throw off the Roman yoke, and having tried in vain to persuade them of the hopelessness of such a struggle, he accepted the post of defending the province of Galilee, and actually held the fortified town of Jotapata against the whole Roman army for forty-seven days. He was captured at the fall of the city, was afterward present in the Roman army at the destruction of Jerusalem (A.D. 70), and went with Titus to Rome, where, assuming the family name of his patron, Flavius, he lived in learned leisure. Here he wrote (in Greek) *The History of the Jewish War*; *The Antiquities of the Jews*, giving a history of the Jews from the earliest times to the reign of Nero; an *Autobiography*, mostly relating, however, to the time of his military activity; a work on the *Antiquity of the Jewish People*, directed against Apion, an Alexandrian grammarian. The date of his death is uncertain. He certainly saw the end of the century.

JOSH'UA, the successor of Moses in the command of the Israelites, was the son of Nun, of the tribe of Ephraim. His name was at first Hoshea (help), but was changed by Moses into Joshua (Jehovah's help), of which Jesus is the Greek form. He was the only one, with the exception of Caleb, who brought back an encouraging report from the land of Canaan. He was nominated by Moses to succeed him in the command of the army of Israel, led the Israelites over the Jordan, and in the course of seven years conquered the greater part of Palestine, and divided the country

among the tribes. He died at Timnath-Serah in Mount Ephraim at the age of 110. His history is contained in the canonical book which bears his name, and of which he has been usually regarded as the author; but modern critics have shown that it is a composite narrative, and contains references to many events which took place after Joshua's death.

JOSIAH, King of Judah, succeeded his father Amon at the age of eight years (639 B.C.). He is characterized in the Scriptures as doing "that which was right in the sight of the Lord." He took an active part in the reform of public worship, and commenced the restoration of the temple, during the progress of which the high-priest Hilkiah discovered the book of the law, thought by some to be substantially the same as the book of Deuteronomy. The prescriptions it contained gave a decided direction to the reform movement which the king conducted with great vigor. In his thirty-first year, prompted probably by friendship to the King of Assyria, he marched out against Pharaoh Necho, who was on his way to attack that kingdom. The two armies met at Megiddo, where Josiah was slain.

JOSS-STICK, in China, a small reed covered with the dust of odoriferous woods, and burned before an idol.

JOUGS (jugz), an instrument of punishment formerly used in Scotland, con-



Jougs.

sisting of an iron collar which surrounded the neck of the criminal, and was fastened to a wall or tree by an iron chain.

JOULE (jöl), James Prescott, English physicist, born in 1818. His most important achievement has been that of settling the mechanical equivalent of heat, which established that the quantity of heat capable of increasing the temperature of 1 lb. of water by one degree Fahrenheit, requires for its evolution the expenditure of mechanical energy represented by the fall of 772 lbs. through the space of one foot. He died in 1889. See Heat.

JOURDAN (zhör-dän), Jean Baptiste, Count, marshal and peer of France, born 1762, died 1833. He distinguished himself under Dumouriez, was made a general of division in 1793, defeated the Austrians at Wattignies and at Fleurus. In 1803 he became a member of the senate, and in 1804, on the establishment of the empire, obtained the rank of marshal, the title of count, and a seat in the council of state. After the restoration he was raised to the peerage.

JOURNALISM. See Newspapers.

JUAN FERNANDEZ, so called from the name of its discoverer, also sometimes Mas-a-Tierra, an island in the South Pacific Ocean, about 400 miles off the coast of Chile, to which it belongs. It is 12½ miles long and 5 miles broad at the broadest part, mountainous, and of rugged aspect. De Foe is said to have founded his Robinson Crusoe on the history of the solitary residence here for over four years (1704-9) of a Scotch sailor, Alexander Selkirk.

JUAREZ (hü-a-reth'), Benito Pablo, president of the Mexican Republic, was born of pure Indian parentage in 1806, and was elected president in 1861. He declared the suspension of public payments for two years to Europeans, a step which occasioned the interference of Britain, Spain, and France. Troops were landed in Mexico, in 1862, but Britain and Spain soon retired, leaving Napoleon III. to carry out his views alone. Maximilian of Austria came on Napoleon's invitation to assume the throne, but Juarez, in spite of defeats and losses, continued to head a resistance, and when Napoleon under pressure from the American government withdrew his troops in 1866, the republicans carried all before them. Maximilian was captured and shot after a mock trial, and Juarez was re-elected to the presidency (1867), which he held till he died (1872).

JUDÆA, a term applied after the return of the Jews from exile to that part of Palestine bounded east by the Jordan and the Dead Sea, north by Samaria, west by the Mediterranean, and south by Arabia Petrea. See Palestine.

JUDAH, the fourth son of the patriarch Jacob by his wife Leah, the progenitor of one of the twelve tribes. See Jews.

JUDAS, surnamed Iscariot, meaning, perhaps, the man of Kerioth, a village of Judæa, was one of the twelve apostles of Jesus, and betrayed his Master into the hands of the Jewish priests for thirty pieces of silver. Remorse for his crime led him to suicide. The Cainites, Cerinthians, and some other heretics held him in great veneration, believing that he alone saw the necessity for bringing about the fulfilment of prophecy and the atonement for humanity. Others have thought that his object was to oblige his Master to use his miraculous power to defeat his enemies and establish the new earthly kingdom of the Messiah, in which Judas expected to have a high place.

JUDAS, or **JUDE**, brother of James, one of the twelve apostles. Matthew and Mark called him Thaddæus surnamed Lebbaeus. Nothing is known of his life. By many he is considered the author of the epistle of Jude. See Jude, Epistle of.

JUDAS MACCABÆUS. See Maccabees.

JUDAS-TREE, natural order Leguminosæ, is a native of the Levant, Spain, south of France, Italy, etc. It grows to a height of about 20 feet with pale green leaves and beautiful purple flowers. Another, though smaller, species grows in the United States and Canada.

JUDE, Epistle of, one of the books of the New Testament. Its canonicity was questioned by the primitive church, and

often since. The Asiatic churches did not make use of it till the 4th century, nor was it known in the west till toward the close of the second. Its quotation from the apocryphal book of Enoch raised a prejudice against it, but it was eventually allowed to take its place as a portion of the sacred canon. It is a passionate denunciation of heretics and false teachers, and has been supposed by some to be written by Judas, the brother of the Savior, and not by Judas the brother of James (see above).

JUDGE, a person duly invested with authority to determine causes or questions between parties according to law. The term is quite a general one, being applicable to any one appointed to sit in a court of law and try causes; but certain judges are designated by some particular title, as justice, lord-justice, etc. The judge at common law decides points of law, and enables the jury rightly to decide questions of fact, while in equity he decides both classes of questions. A judge cannot be prosecuted for the consequences of his decisions, except in the case where he may have acted without jurisdiction, nor can he officiate in a case where he has a personal interest, unless it be merely his common interest as a citizen, ratepayer, etc.

JUDGE ADVOCATE, an officer appointed to preside at the proceedings of court-martial, his duties being to summon witnesses, administer oaths, take a minute of the proceedings, advise the court on points of law, etc. In Britain (as also in the United States) there is an official called the judge advocate-general to whom the proceedings of courts-martial are transmitted. He has also to advise the commander-in-chief and secretary of state for war in legal matters. The judge advocate-general must be a member of the House of Commons and of the ministry. Under him is a deputy whose office is permanent.

JUDGES, in Hebrew history. See Jews.

JUDGES, Book of, a canonical book of the Old Testament, so called because the greater part of the narrative is occupied with the history of the judges who were raised up to deliver their countrymen from the oppressions of the neighbors. The first chapter, although formally connected with the book of Joshua by the opening sentence, evidently contains a separate portion of the history of the Israelitish invasion of Canaan, the first settlement, indeed, west of the Jordan, in which the tribes of Judah and Simeon play a distinct part in the conquest. The 6th verse of the 2d chapter again connects the work with the concluding part of the book of Joshua and in the chapters which follow the history of the nation is written from an ideal and poetic point of view, which gives it unity, the judges being represented as successive rulers, although in most cases their history and influence were merely local. The third part of the book begins at chap. xvii., and has no formal or chronological connection with what has gone before, and has sometimes been called an appendix.

JUDGMENT, in law, the judicial determination and decision of a court in an action. It is either interlocutory or final.

In the former case it is given only on some particular point or proceeding, and does not complete the action in the same way as the final judgment, upon which, unless it be appealed against, suspended, or recalled, execution may follow.

JUDGMENT-DEBT, in law, a debt secured to the creditor by a judge's order, and in respect of which he can at any time attach the debtor's goods and chattels. Such debts have the preference of being paid in full, as compared with simple contract debts.

JUDITH, widow of Manasses, a Jewish heroine of great beauty, virtue, courage, and piety, whose history is given in the apocryphal book which bears her name, the author and age of which are unknown. Judith is represented as going out to the tent of Holofernes, an Assyrian general who was besieging Bethulia, the city in which she lived, charming him with her beauty, and taking advantage of the admission to his tent, thus afforded to her, to cut off his head with his own sword, while he slept.

JUDSON, Adoniram, pioneer American missionary, was born at Malden, Mass., in 1788. In 1812 he was ordained a missionary to Burmah under the auspices of the Congregational board of Foreign Missions. Having after his arrival in India adopted Baptist views, he was appointed to labor in Burmah by the American Baptist missionary union in 1814. His translations of the Bible into Burmese appeared in 1835, and his Burmese and English dictionary in 1852. He died April 12, 1850. Both in his literary and his missionary labor he was greatly assisted by the three ladies whom he successively married, of whom, as well as of Judson, biographers have been published.

JUDY. See Punch and Judy.

JUGGERNAUT. See Jagannātha.

JUGGLING. See Legerdemain.

JU'GULAR VEIN, one of the large trunks by which the greater part of the blood that has circulated in the head, face, and neck is returned to the heart. There are two on each side, an external or superficial, and an internal or deeper.

JU'JUBE, the popular name of a genus of spiny and deciduous shrubs or small trees. The species are numerous and of several the fruit, which is blood-red or saffron-colored with a sweet granular pulp, is wholesome and pleas-



Jujube.

ant to eat. The common jujube is a native of Syria. The fruit is dried, and forms an article of commerce. The name jujube is also given to a confection made of gum-arabic or gelatin, sweetened and

flavored so as to resemble the jujube fruit.

JUJUY (hū-hō'i), a town of the Argentine Republic. Pop. 5000.—The province has an area of 27,000 sq. miles, and a pop. of 90,000.

JULEP, a sweet drink; specifically, in medicine, a solution of sugar in aromatic water, but not so concentrated as syrup. In the United States the name is given to a drink composed of spirituous liquor as brandy or whisky, sugar, pounded ice, and a seasoning of mint. It is also called mint-julep.

JULIAN CALENDAR. See Calendar and Epoch.

JULIUS, the name of three popes.—Julius I., born in Rome, chosen pope in 337; died in 352. He summoned a council which approved his conduct in sustaining Athanasius in his contest against the Arians in 342.—Julius II. (Giuliano della Rovere), was elevated by his uncle Sixtus IV. to the rank of a bishop and cardinal, was appointed papal legate to France, in 1503 was elevated pope, and died 1513. Immediately on his elevation to the pontificate he planned the complete re-establishment of the papal sovereignty in its ancient territory, and the extinction of foreign domination and influence in Italy. Refusing to attend the Council of Pisa convened by the King of France, he in 1511 formed the "Holy League," to which Spain, England, and Switzerland were parties. In 1512 he made open war against Louis XII. The French defeated the papal army near Ravenna, but were soon after driven out of Italy. He is considered one of the most immoral of the popes, but was a far-sighted and patriotic sovereign, and a liberal and judicious patron of art and literature. To procure means for building St. Peter's he ordered the sale of indulgences, which was one of the immediate causes of the reformation.—Julius III. (Giovanni Maria Giocchi), a Roman of low birth, was made cardinal by Paul III. in 1536, took an active part in the council of Trent as papal legate, was elected pope in 1550, and in the following year reopened the council of Trent, which had been suspended for upward of two years. He endeavored to effect a union with the Nestorians, and commissioned Cardinal Pole to organize, in conjunction with Mary, the reunion of England with Rome. He died in 1555.

JULIUS CÆSAR. See Cæsar.

JULY', the seventh month in our calendar, having 31 days. In the Roman year it bore the name of Quintilis, as originally the fifth month. Its change of name to Julius was in honor of Julius Cæsar, who was born on the 12th of the month.

JUMPING-DEER, the black-tailed deer found in the United States to the west of the Mississippi.

JUMPING-HARE, a species of jerboa found in Southern Africa, and so named from its general resemblance to a hare, while its jumping mode of progression, necessitated by the elongated nature of the hind legs, have procured for it its generic and popular distinction.

JUMPING-MOUSE, is found in Labrador and North America generally, but is especially an inhabitant of the fur territories. Like the jumping-hare, it is

classified by some along with the jerboas and is one of the smallest of these forms.

JUNA'GARH, a native state of India, in Gujarat, Bombay presidency; area 3283 sq. miles. Pop. 387,499.—The capital, Junagarh, is one of the most picturesque cities in India, pop. 34,251.

JUNE, the sixth month in our calendar. It consisted originally of twenty-six days, to which it is said Romulus added four, and Numa took away one. Julius Cæsar again lengthened it to thirty days, and it has ever since remained unaltered.

JUNGFRAU (yung'frou; "Maiden"), a mountain of Switzerland. It is one of the most magnificent of the Swiss mountains, height 13,670 feet. It was first ascended in 1804; the ascent may now be made by railway.

JUNGLE (jung'gl), properly an Indian term applied to a desert and uncultivated region whether covered with wood and dense vegetation or not, but in English it is applied to land covered with forest trees, thick impenetrable brushwood, or any coarse rank vegetation.

JUNGLE-FEVER, a disease prevalent in the East Indies and other tropical regions, a severe variety of remittent fever. It is characterized by the recurrence of paroxysms and of cold and hot stages. The remissions occur usually in the morning and last from eight to twelve hours, the fever being mostly typically developed at night.

JUNIN (hō-nēn'), a department of Peru, embracing the wildest parts of the Cordilleras; area about 28,000 sq. miles; pop. 395,000.

JU'NIPER, the name of hardy exogenous evergreen trees and shrubs chiefly natives of the northern parts of the world. About twenty species are known. The berries require two years to come to



Juniper.

maturity, when they assume a bluish-black color. They are used extensively in Holland in the preparation of gin, which owes its characteristic flavor to them. They yield an essential oil, which is a powerful diuretic.

JU'NIUS, a signature attached to certain letters on public affairs which first appeared in The Public Advertiser, a London paper published by Woodfall, from which they were copied into most of the other journals of the time. The earliest bears date January 21, 1769; the last, January 21, 1772. After they were completed they were collected and published by Woodfall, with a dedication to the English nation and a preface by the author. Other letters bearing the same characteristics, but having different signatures, appeared between April 28, 1767, and May 12, 1772, and are given in the younger Woodfall's edition

as the Miscellaneous Letters. This edition was published in 1812 in three vols., and included Junius' private letters to Mr. H. S. Woodfall, and a preliminary essay by Dr. J. Mason Good. Although fully a century has elapsed since the publication of these papers, their authorship seems as far from being settled as ever.

JUNK, a flat-bottomed ship used in the waters of China and Japan, sometimes reaching 1000 tons. It has a high forecastle and poop, and ordinarily three



Chinese Junks.

masts of considerable height, each mast being in one piece, with a lug-sail, generally of bamboo splits. The bow is bluff the stern full, and there is a very large rudder.

JUNO, the most exalted divinity of the Latin races in Italy next to Jupiter, of whom she was the sister and wife. She was the queen of heaven, and under the name of Regina (queen) was worshipped in Italy at an early period. She bore the



Juno of Lanuvium.—Colossal statue in the Vatican Museum, Rome.

same relation to woman that Jupiter did to men. She was regarded as the special protectress of whatever was connected with marriage, and females from birth to death had her as a tutelary genius. She was also the guardian of the national finances, and a temple, which contained

the mint, was erected to her under the name of Juno Monēta on the Capitoline.

JUNOT (zhū-nō), Andoche, Duke of Abrantes, French marshal, was born in 1771 and died 1813. At the siege of Toulon, in 1793, he became secretary to Napoleon, who afterward took him with him into Italy and Egypt in the capacity of aide-de-camp. In 1807 he was sent with an army into Portugal, and made his entry without opposition into Lisbon, his success being rewarded with the title of Duke of Abrantes. On the arrival of the British he first allowed himself to be defeated at Vimeira. Although he subsequently took part in the campaigns (1809) against Austria, (1810) against Spain, and (1812) against Russia, he failed to retrieve his reputation. In 1813 he became insane, and lost his life by leaping from a window.

JUNTA (Spanish, an assembly), in Spain, a high council of state. It was originally applied to an irregularly summoned assembly of the states, as distinguished from the Cortes or parliament regularly called together by the authority of the king.

JU'PITER, or **JUPPITER**, the supreme deity of the Latin races in ancient Italy, the same as the Greek Zeus, and the Sanskrit dyaus (which means the sky); the second part being the same as the Latin pater, father. As the supreme deity Jupiter received from the Romans the title of optimus maximus (best greatest), and as the deity presiding over the sky he was considered as the originator of all the changes that took place in the sky. From him accordingly proceeded rain, hail, and the thunderbolt, and he it was that restored serenity to the sky after it had been obscured by clouds. Hence the epithets of Pluvius (rainy), Tonans (thundering), etc., were applied to him. The most celebrated of his temples was that on the Capitoline Hill dedicated to him as Jupiter Optimus Maximus, jointly with Juno and Minerva. He was represented with a scepter as symbolical of his supreme authority. He maintained the sanctity of oaths; he was the guardian of all property; and every Roman was believed to be under his protection, and that of his consort Juno, the queen of heaven. White animals were offered up to him in sacrifice, his priests wore white caps, and his chariot was represented as drawn by four white horses.

JUPITER, is the largest planet of the solar system, and the fifth (excluding the asteroids) in order of distance from the sun. His mean diameter is about 85,000 miles; his polar diameter about 82,200; his mean distance from the sun 475,692,000 miles; his period of revolution round the sun 11 years 10½ months; his orbit is inclined to the ecliptic at the angle 1° 18' 40".3. The inclination of his axis is very small (3° 5' 30"), so that changes in the seasons must be almost unknown; his volume is 1233 times that of the earth, but his mass is only 300.857 times. His surface shows belts of dark and light shade, which are usually, but not always parallel to each other, undergo quick changes, and seem as though they merged into one another. To account for these rapid changes in his atmosphere it seems reasonable to be-

lieve that his interior mass is intensely heated similarly to that of the sun, hence the intense light proceeding from this planet. Jupiter has four moons, Io, Europa, Ganymede, and Callisto; they were discovered by Galileo in 1610; they are at average distances of from 267,380 to 1,192,820 miles from the planet; they appear, like our moon, to make one revolution on their axis while passing once round the planet, the time of one revolution being from 1 day 18 hours 27 minutes to 16 days 16 hours 32 minutes. Europa, the smallest, has a diameter of 2099 miles; Ganymede, the largest, has



Jupiter.

a diameter of 3436 miles. The moons appear from the earth to move in nearly straight lines from one side of the planet to the other, so that the planes of their orbits are nearly the same as the ecliptic and the orbit of Jupiter; they are eclipsed in the shadow of the planet, and their own shadows may be seen passing over the planet's surface. From observation of the eclipses of Jupiter's satellites Römer discovered that the propagation of light is not instantaneous, and thus calculated its velocity.

JURA (zhū-rá), a department in the east of France, bordering on Switzerland; area, 1938 sq. miles. Pop. 261,288.

JURA, a chain of mountains in Central Europe, partly belonging to France, partly to Switzerland, between which they form a sort of natural barrier, extending from southwest to northwest, and exhibiting a number of parallel ridges.

JURISPRUDENCE, the science of law.—Medical jurisprudence, forensic medicine (which see).

JURY AND JURY TRIALS, the origin of trial by jury is not traceable to any single legislator or any particular period. It seems to have had its beginning in certain primitive customs of the northern European races, and received special developments from different nations. By the Anglo-Saxons a person who was accused of crime was permitted to summon twelve of his neighbors, called compurgators, who swore to his innocence. This was the origin of an institution which took settled and vigorous form after the Norman Conquest, gradually developing into its present form.

In criminal trials two juries act, the grand jury and the petit jury. The

grand jury may consist of any number more than eleven, and less than twenty-four men, who have been summoned by a mandate from the sheriff of the county. Their names are returned on a piece of parchment which is called a panel. The oath having been administered, they are usually instructed by the presiding judge in the nature and number of the offenses about to be brought before them. They then proceed to consider in private the statement or indictment which is brought against the accused by the prosecution. Should they agree to the number of twelve, that the accusation has a basis of truth, they bring into court what is called "a true bill." If, on the contrary, they find that there is not sufficient foundation for the accusation, they ignore the bill, and require the dismissal of the accused. When a true bill is found by the grand jury it usually forms the basis of the subsequent prosecution.

Petty or petit juries consist of twelve persons, and no more, for the trial of all criminal offenses, and of all issues of fact in civil cases at the common law. If all the jurors do not appear, or any of them are justly objected to and set aside, in virtue of the right of challenge exercised by the parties to a suit, the deficiency may be supplied from among the bystanders having suitable qualifications. The jury being then sworn is placed in the jurybox, and the evidence given. No juror is at liberty to leave the box without permission of the court. Unless the case be a criminal one in which the prisoner is charged with a misdemeanor, the jury are allowed to go home on engaging not to allow themselves to be spoken to on any subject connected with the trial. When the prisoner is charged with treason or felony the jury are usually allowed to retire only in custody of the sheriff and his officers, who are sworn to keep them together, and not to speak to them with reference to the trial. When the evidence has been led it is usual for the presiding judge to instruct the jury in the points of law which apply to it. It is thus that their duties are divided—the jury dealing with the facts, and the judge with the law of the case. The jury usually form an independent judgment upon the facts and their finding is considered final. To consider their verdict they usually withdraw to a private room, where no intercourse with other persons is permitted, and where, when the session is protracted, food and other necessities are supplied. Upon returning into court they publicly assent to such verdict as they have agreed upon. If they fail to agree among themselves the jurymen are discharged by the judge, and the cause, if it is civil, can be tried anew. When it is a criminal case no new trial is possible.

Another kind of jury is the coroner's jury, summoned to inquire into cases of sudden or violent death. The inquiry is made in presence of the body, and at the place where the death happened. The jury may consist of any number above eleven, and usually numbers twenty-three; twelve must concur in the finding. The persons found guilty are reserved for trial by a petty jury.

In the United States, in Canada, and the other British colonies, jury trials are

essentially the same as in England. In France they are only applicable to criminal cases, and the verdict is returned by a majority. Trial by jury is in force in Italy, and in the German empire.

JUSTICE, a common term for a judge or legal official appointed to hold court and administer justice, especially given to judges of superior courts. Thus in England the judges in the common law and chancery divisions of the high court of justice are so called, the head of the common law division being the lord chief-justice of England. The term is similarly used in the United States.

JUSTICE, High Court of. See Supreme Court.

JUSTICE, Lord Chief. See Chief-justice.

JUSTICE, Department of, one of the ten executive departments of the United States, the head of which is the attorney-general, appointed by the president for a term of four years. The attorney-general is the chief law officer of the government, and, as a member of the cabinet, ranks fourth in the line of succession to the presidency. It is his duty to advise the president on any questions of law that may arise in the course of the administration, and also to give his opinion when requested by any of the heads of departments upon legal questions concerning matters affecting their departments. The opinions rendered by the attorney-general are from time to time published by the government, and next to the decisions of the courts they are regarded as authority on the points covered. The attorney-general is the legal representative of the government in all cases at law to which the United States is a party, and may appear in court in person or direct which one of the assistant attorney-generals shall appear, and may employ special counsel to aid in the conduct of the cases in which the government is interested.

JUSTICE OF THE PEACE, a judicial magistrate intrusted with the conservation of the peace. The first judicial proceedings are held before him in regard to arresting persons accused of grave offenses; and his jurisdiction extends to trial and adjudication for small offenses. In case of the commission of a crime or a breach of the peace a complaint is made to one of these magistrates. If he is satisfied with the evidence of a commission of some offense, he issues a warrant directed to a constable, tries the party, if the offense be within his jurisdiction, and acquits him or awards punishment. In the United States the office is held only by special appointment, and the tenure is different in different states; but the commission is usually for three or four years, or some other specific limited period. Their position is similar to that of the justices in Britain. In some of the states they have a right to celebrate marriages.

JUSTIFIABLE HOMICIDE. See Homicide.

JUSTIN, Justi'nus, the name of two emperors of the east.—Justin I., born 450, died 523 A.D., a peasant of Dacia, rose from a common soldier to be commander of the imperial guard, and on the death of Anastasius in 518 became emperor. He relegated the civil admin-

istration to the quæstor Proclus, and between them the empire was governed with a fair amount of success.—Justin II. ascended the throne on the death of his uncle Justinian I. in 565. Beset with enemies outside the empire and harassed with internal discord, he in 574 solved his difficulties by abdicating in favor of Tiberius, captain of the guard. He died in 578.

JUSTINIAN I., Flavius Anicius Justinianus, surnamed the Great, nephew of Justin I., emperor of the east, celebrated as a lawgiver, was born of an obscure family in 483 A.D., and died in 563. Patronized by his uncle, who, from a Thracian peasant, had become emperor, he so flattered the senate and dazzled the people that he was made consul, and took the title of Nobilissimus. On the death of his uncle, with whom he had latterly shared the imperial power, he was proclaimed emperor and married an actress named Theodora. Aided by his generals, he was able subsequently to restore to the Roman empire a part of its former possessions, as when Belisarius in 523 and 529 defeated the Persians, and achieved victories in Africa, and when Narses, another of his generals, put an end to the Ostrogoth rule in Italy. Turning his attention to the laws, Justinian commissioned ten learned civilians to draw up a new code, and the result was the Corpus Juris Civilis, or body of civil law. His reign of thirty-eight years was a great period in the empire's history, but the emperor himself was by no means great.

JUSTIN MARTYR, an early Christian writer, born in Palestine about 100 A.D., suffered for his faith about 165. Born a heathen but converted to Christianity, he went to Rome, where he wrote an Apology for Christianity, with a supplementary or second Apology, a Dialogue with Trypho the Jew, all still extant, besides other works. He is of importance in the history of Christian dogma.

JUTE, a textile fabric obtained from *Corchorus capsularis*, a plant belonging to the natural order Tiliaceæ (lime or



Jute.

linden). The jute plant is a native of the warmer parts of India, where its cultivation is carried on, especially in Bengal, on an extensive scale. It is an annual plant, growing to a height of 12 or 14 feet. The fiber forms the inner bark of the plant, and possesses in an eminent degree the tenacity common to the bark

of the plants of this order. The fiber is fine, and has a shining surface; it is injured by exposure to water, and hence is not well adapted for cordage and canvas, but it is in extensive use for making bags, and it serves many other useful

purposes, being often mixed with hemp for cordage, and even with silk in the manufacture of cheap satins, although its principal use is in the manufacture of coarse cloth for bagging, and in making the foundation of inferior carpets, mats, etc.

JUTLAND, the peninsular and most important portion of Denmark, surrounded on three sides by the sea—the Skagerrack, the Kattegat, and the North Sea, on the south by Schleswig; area, 9755 sq. miles. Pop. 1,063,792.

K

K,¹ the eleventh letter of the English alphabet, representing a guttural articulation, the surd consonant corresponding to the sonant g. In Anglo-Saxon this letter was only used occasionally, c being regularly used instead. So also in Latin, k, borrowed from the Greeks, was little used, its place being supplied by c. The Italians, Spaniards, and Portuguese have banished the letter entirely from their alphabet. The French use it only in a few words derived from the Greek, foreign proper names, etc. At the beginning of a word or syllable k is not pronounced when followed by n, as knife, knee, know.

KABUL. See Cabul.

KAFFA, a mountainous territory to the south of Abyssinia, inhabited by one of the Galla tribes. It is supposed to be the home of the coffee-plant, which grows wild on the slopes of the Kaffa hills. The chief town is Bonga.

KAFFIR OX, the Cape buffalo. See Buffalo.

KAFFIRS, the principal race inhabiting Southeastern Africa, a branch of the great Bantu family. The name is now chiefly restricted to the tribes occupying the coast districts between Cape Colony and Delagoa Bay. They differ from the negroes in the shape of the head, it being more like that of Europeans; in the high nose, frizzled hair, and brown com-



Kaffir chief of the Zulu tribe.

plexion, which becomes lighter in shade in the tribes of the more southern districts. They are a tall, muscular race, the average height being from 5 feet 9 inches to 5 feet 11 inches, and frugal and simple in their habits. Their chief occupation is raising and tending cattle, and hunting; garden and field work is

mainly performed by women. They are of a peaceful disposition, but in times of war they display considerable bravery, tactical skill, and dexterity in the handling of their assagais or spears, shields and clubs, as has been shown in their engagements with the British forces. Frequent hostilities have taken place between the British and one or other of the Kaffir tribes, beginning almost with the first acquisition by Britain of the Cape Colony. The first Kaffir war was in 1811-12, the next in 1818-19. In



The kahau, or long-nosed monkey.

1834-35 a serious Kaffir war was carried on, resulting in the expulsion of the Kaffirs beyond the Great Kei, but they were soon allowed to return. Another war (the fourth) broke out in 1846, and lasted nearly two years, with much suffering to both colonists and Kaffirs. Its result was an extension of territory in the north and east, a portion between the Cape Colony and the Kei being reserved for the natives, and called British Kaffraria. In 1850 a Kaffir outbreak took place, and a bloody war followed ending in 1853, soon after which British Kaffraria was made a crown colony. A sixth war occurred in 1877-78, owing its origin to disputes between the two tribes of the Fingoes and Gealekas. For a subsequent war see Zululand.

KA'HAU, or **BLANDA**, the native name for a large, odd-looking monkey peculiar to Borneo, better known as the proboscis monkey from its long, pendent nose, which in old animals reaches a length of 3 or 4 inches. The face is cinnamon brown, the body reddish with conspicuous markings of white. It associates in small troops, is usually found over or near the water, and is very shy.

KAISER ((kî'zér), the German word for emperor, from L. Cæsar.

KAISERSLAUTERN (kî'zêrz-lou-térn), a town in the Bavarian Palatinate, on the Lauter. Pop. 48,310.

KAISER-WILHELM CANAL. See North Sea and Baltic Canal.

KAISER-WILHELMS-LAND. See New Guinea.

KALAMAZOO', a town, county, and river of Michigan. The city is 144 miles e.n.e. of Chicago, situated in a fertile agricultural district, on the river of the same name, which supplies some of its numerous factories with water power; chief manufactures: paper, flour, furniture, and agricultural implements. Pop. 1909, estimated at about 45,000.

KALE. See Cabbage.

KALEIDOSCOPE (ka-li'-), a well-known optical toy invented by Sir David Brewster, by which an infinite variety of symmetrical, and often beautiful, colored designs is obtained. The ordinary kaleidoscope consists of a tube containing two glass plates acting as mirrors, which extend along its whole length and make an angle of 60° with one another. One end of the tube is closed by a metal plate with a small hole at its center, to which the eye is applied; at the other end there are two plates, one of ground the other of clear glass (the latter being next the eye), with a number of pieces of colored glass or beads lying loosely between them. When the eye is applied to the aperture the mirrors produce a beautiful symmetrical figure, and when the tube is turned about or shaken, new images, always symmetrical are formed. This arrangement may be modified in various ways. The instrument has been used by designers of patterns for printed calicoes, etc.

KALENDAR. See Calendar.

KALIF. See Caliph.

KALISCH (kă'lish), or Kalisz, a town and government in Russian Poland, near the Prussian frontier. Area of government 4392 sq. miles, pop. 846,719. The town is an important trade center, and the capital of the province. Pop. 21,680.

KAL/MUCKS, a nomadic and warlike Mongol race, originally natives of the



Kalmuck.

territory of Central Asia between the Koko-Nor and Tibet, but now inhabiting not only parts of the Chinese empire, but also occupying districts of Siberia

¹Where the reader may fail to find articles under K, he is referred to C.

and European Russia. They are intrepid soldiers, splendid horsemen, and troops of them are attached to almost every Cossack regiment. Physically the Kalmucks are small of stature, broad-shouldered, with small round heads, and the narrow oblique eyes characteristic of the Mongolian race. They number altogether perhaps 700,000, of whom more than half are under Chinese rule.

KALU'GA, a town and government of European Russia. Pop. 40,252.

KAMA, the largest tributary of the Volga, rises in the Russian government Viatka, and after a course of 1150 miles flows into the Volga, 40 miles south of Kasan. Part of it is navigable for steamers, and ordinary barges can proceed as far as Perm.

KAMA (kā'ma), the Hindu god of love corresponding, generally speaking, to the Greek Eros and Roman Cupid. He appears as a beautiful youth riding on a parrot, generally carrying a bow with a string formed of bees, and having five



Kama or Kamadeva.

arrows, each tipped with a flower that is supposed to have some amorous influence. Dancing girls or nymphs bear him company, and one carries his banner, the emblem on which is a fish or marine monster on a red ground.

KAM'ALA, a drug long known, under various names, to Indian and Arab physicians, as a specific against the tapeworm, introduced in the British Pharmacopœia in 1864 as a vermifuge, in doses of 30 grains to a quarter of an ounce in syrup or gruel. It occurs as a brick-red powder, adherent to the fruit of the *Rottlera tinctoria*, formed by minute roundish, semi-transparent granules mixed with stellate hairs, and is largely collected in the forests of Madras, where it forms an important source of revenue. The active principle of the powder lies in the 80 per cent of resin it contains, which also supply the coloring matter, called rottlerin, used as a silk dye.

KAMRUP (kām-röp'), a district of Assam, in the Brahmaputra valley; area, 3857 sq. miles. Pop. 634,249.

KAMTCHAT'KA, a large peninsula in the northeast of Asia. On the east it has the North Pacific Ocean, and on the west the Sea of Okhotsk; it is upward of 800 miles in length and 190 in average breadth; sq. miles, 85,000. The entire population is about 11,500. The capital, Petropaulovsk, has a pop. of about 1000.

KANAZA'WA, a town of Japan, near

the northwest coast of the island of Hondo (Nippon), with manufactures of silks, porcelain, etc. Pop. 91,531

KANDAHAR', or **CANDAHAR**, a town of considerable commercial and strategic importance in the south of Afghanistan, on the direct route to India. The town lies 3484 feet above the sea, has a large transit trade, and a pop. of 60,000.

KANE, Elisha Kent, a surgeon, traveler, and Arctic explorer, born at Philadelphia 1820, died at Havana 1857. In 1846 he rendered important service as a volunteer in the United States army in Mexico, in 1850 by his survey of the Gulf of Mexico, and in the same year joined the Grinnell expedition, as medical and scientific member, in the unsuccessful search for Sir John Franklin. His observations led him to the belief that there was a large open sea near the pole, and with a view to penetrate it he organized and commanded a second expedition, which left New York in the *Advance* in May, 1853. He succeeded in getting as far as 78° 43' n. lat., where he was frozen up for twenty-one months, and being harassed by scurvy and want of provisions was obliged to abandon the vessel. A perilous journey of 1300 miles in boats and sledges brought him back to Greenland, and he again reached New York in November, 1855. Much broken in health, he sailed for Cuba to recruit, but died there. The accounts of his two expeditions added much to our knowledge of the Arctic regions.

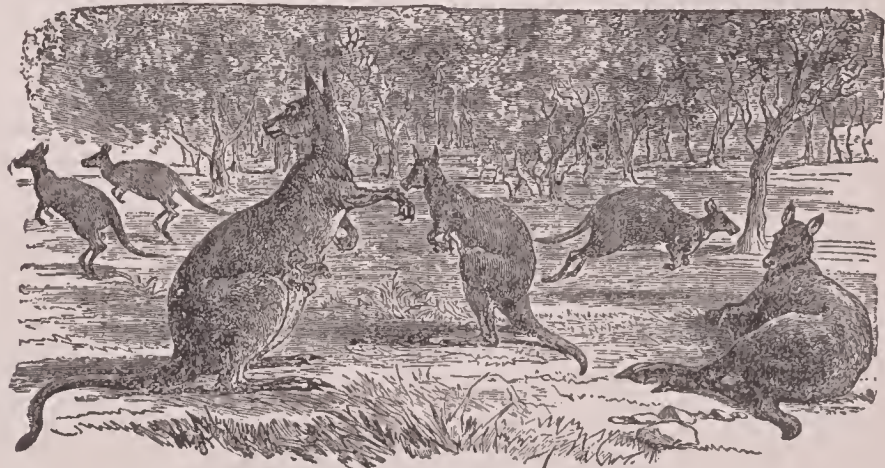
KANGAROO, the common name of a number of animals belonging to the marsupial order of mammals, indigenous to Australia, and first made known to Europe by Captain Cook. The most noticeable feature about the kangaroo

still plentiful, a serious pest to squatters, whose rifles have, however, considerably reduced their number. The hind-quarters of the large species supply a tolerable substitute for venison, while their tails make excellent soup, and their skins good rugs and leather. The kangaroo includes many species, varying in size from a hare to a large sheep, and remains of still larger and extinct species have been found in the pleistocene deposits of Australia.

KANKAKEE, the county-seat of Kankakee co., Ill., 56 miles south of Chicago; on the Kankakee river, and on the Cleveland, Cincinnati, Chicago, and St. Louis, the Illinois Central, the Indiana, Illinois, and Iowa and other railroads. The river, broad and deep at this point, furnishes water-power, for manufacturing purposes, as well as for generating electricity for city lighting and the operation of street railways. The most important manufactures are plows, buggies, starch, and iron beds. Pop. 16,400.

KANGRA, a large district of Hindustan, in the Punjab, belonging mainly to the Himalayan chain; area, 9069 sq. miles. About a ninth is under cultivation, and large tracts are covered with forests. The inhabitants are a good-looking, fair-complexioned race, mild and peaceable, and much attached to their country. Pop. 763,030.

KAN'SAS, one of the United States, bounded n. by Nebraska, e. by Missouri, s. by Oklahoma and Indian Territory, w. by Colorado; area, 82,080, sq. miles. It ranks tenth in size among the states of the Union. It consists chiefly of undulating plains, well watered by the Kansas and Arkan-



Kangaroo.

is the disproportion between the upper and lower parts of the body. The head is small, deer-like in shape, with large ears; the forelegs small and five-toed; the hindlegs very large and powerful, with four toes only on the feet. The tail is long, thick at the base, and helps to support the animal when sitting erect, the usual posture when not feeding; it also assists the hindlegs in their long leaps (from 10 to 15 feet). The young are born very immature, and protected and nourished for about eight months in the marsupium, or pouch, into which the nipples of the mammary glands open. Kangaroos are herbivorous, and, where

sas and other rivers, the Missouri forming the boundary on the northeast. Kansas is pre-eminently an agricultural state, the total farm land being over 80 per cent of its surface, of which over 60 per cent is improved. It has risen with great rapidity to the front ranks of the agricultural states. In 1900 only one state, Iowa, had a larger acreage of crops. In the last census year the rank in acreage of corn was third, wheat fourth, and hay third. Potatoes and other vegetables are also raised in large quantities. It also raises a great abundance of orchard fruits. The bright climate and pure atmosphere are ad-

mirably adapted to the growth of the apple, pear, peach, plum, grape and cherry. Creameries are numerous. Kansas ranks second in the production of broom-corn and is important in the production of castor-beans. The raising of enormous crops of corn and other stock feed has resulted in the development of a large stock raising industry, extensive areas of prairie land in the western part of the state being used for grazing grounds. Timber is abundant along the streams in the eastern section of the state but is less plentiful in the central portion and very scarce in some parts of the west. The varieties of timber embrace oak, elm, black walnut, cottonwood, mulberry, box elder, willow, hickory, sycamore, white ash and other hard and soft woods.

The climate of Kansas is in general very pleasant; the air is clear and dry, and sunny days by far predominate. The mean annual temperature ranges from 52° in the north to 58° in the south. The mean rainfall for the whole state is 26.42 inches, but it ranges from 40 inches in the east to 15 in the west.



Seal of Kansas.

With irrigation of the western lands there is very little soil in Kansas unfit for agriculture. The rich bottom-lands of the numerous rivers occupy a large area, and beyond these the prairies are everywhere extremely fertile, especially in the eastern half of the state, where it is rich and black, gradually becoming lighter and browner toward the west.

Deposits of bituminous coal probably underlie more than half of the state. Natural gas occurs in the southeastern part. Lead and zinc ores occur in association in the limestone of the lower carboniferous in the southeast. The ores are chiefly galena and blende. Running north and south through the center of the state are extensive deposits of rock salt and gypsum. Large deposits of chalk and clay are found. Equally inexhaustible are the building-stones.

In 1541 a small force of Spaniards and Indians under Coronado traversed the region from southwest to northeast; but no results followed this expedition. The country remained unexplored till 1719, when it was visited by Frenchmen from Louisiana. In 1803 the greater portion of what is now Kansas passed into the possession of the United States as a part of the Louisiana Purchase; the southwestern section of the

state was ceded by Texas to the Federal Government in 1850. The region was explored by Lewis and Clark in 1804, Lieutenant Pike in 1806-07, and Lieutenant Long in 1819.

In the civil war Kansas sent into the field a larger number of soldiers, in proportion to its population, than any other state. The eastern part of the state lay exposed to the incursions of confederates from Missouri. On August 23, 1863, Quantrell's guerrillas raided the town of Lawrence and killed a large number of the inhabitants. The cessation of war was followed immediately by a great influx of immigrants, who swept steadily westward, unchecked by the repeated assaults of the hostile Indian tribes. Railway development began in 1868, and by 1872 there were more than 2000 miles of railway track in operation. Prohibition became an important question in politics after 1880; the movement encountered great opposition in the beginning, but by 1890 the principle was well established in the state, though in the large cities the anti-liquor laws were not zealously enforced. Education is well provided for, and there is a state university, an agricultural college, and other colleges and normal schools. It has over 5000 miles of railroad. The chief towns are Leavenworth, Lawrence, Topeka, and Atchison; Topeka being the state capital. In politics Kansas belongs to the republicans. They have carried the state with only three exceptions since the civil war; in 1882, 1892, and 1896. Pop. 1909, 1,700,000.

KANSAS CITY, the largest and most important city of Kansas, and the county seat of Wyandotte co., on both sides of the Kansas river at its confluence with the Missouri, opposite and joining Kansas City, Mo. It is an important railroad center, the Missouri Pacific, the Union Pacific, the Atchison, Topeka and Santa Fé, the Mexico and Orient and the Chicago, Rock Island and Pacific entering the city. Several bridges across the Kansas river unite the east and west sections of the city, which is closely connected also with Kansas City, Mo., by elevated, electric and cable roads. It is noted for its important live stock slaughtering and meat packing interests in all of which it is allied with the adjacent city—the stock yards and packing house plants on both sides of the Kansas-Missouri boundary forming the second largest live stock center in the United States. It is also an important grain and flour market. Pop. 60,000.

KANSAS CITY, the second city of Missouri, and an important railroad and commercial center, in Jackson co., at the junction of the Kansas and Missouri rivers; on the Kansas-Missouri boundary line, adjoining Kansas City, Kan., and 235 miles west by north of St. Louis. Many of the most prominent railroads of the country pass through or have a terminus in the city. Three great bridges have been constructed across the Missouri river, and a terminal circular railway, 30 miles in length, furnishes intercommunication among the several roads. Most of the roads use in common a large union depot.

Kansas City is highly important as a

commercial center. As the distributing point for a vast agricultural region to the west and south it controls large wholesale interests, its jobbing trade in farming implements ranking among the most extensive in the United States. In the grain, live-stock, and meat-packing business, Kansas City is closely allied with Kansas City, Kan., the two municipalities forming practically one industrial and commercial community. The elevators have a storage capacity of over 6,200,000 bushels, and a handling capacity of 1,425,000 bushels. The Kansas City stock yards handle annually 125,000 cars of live stock valued at over \$130,000,000, including 2,000,000 head of cattle and 3,700,000 hogs, besides large numbers of sheep, calves, horses and mules. The mills have a total output of over 1,825,000 barrels of flour (1,430,000 barrels), oatmeal, and cornmeal.

The first permanent settlement at Kansas City was made in 1821 by a small company of French fur traders, headed by François Chomteau. In 1838 a town was laid out, and in 1853 it was incorporated as a city. It was the starting-point of the first railroad across the plains, and received its first commercial impetus in 1865, when the Missouri Pacific railroad reached it. After this date its growth was exceedingly rapid. Pop. 1909, estimated at 300,000.

KANSAS STATE AGRICULTURAL COLLEGE, a coeducational institution of learning at Manhattan, Kan. The college owns 323 acres of land, valued at \$39,700, and leases 221 acres in addition, the greater part of these grounds being used for experimental work. The courses embrace English, general and domestic science, mechanical and electrical engineering, and agriculture, leading to the degree of bachelor of science, a preparatory department, a musical department, and apprentice courses, designed for those who wish to learn a trade.

KANSAS, UNIVERSITY OF, a coeducational state institution at Lawrence, Kan., established by act of the legislature in 1864 and opened in 1866. The university comprises a graduate school; school of arts, law, medicine, pharmacy, engineering and fine arts; and the university geological survey. It confers the bachelor's degree in arts, science, law, medicine, music and painting; the master's degree in arts and science, the doctor's degree in philosophy; and the degree of civil and electrical engineer. Tuition is free to residents of Kansas.

KANSAS RIVER, a river of Kansas, formed by the junction of the Solomon and Smoky Hill (the latter rising in the Rocky Mountains), traverses the state in an easterly direction, and falls into the Missouri near Kansas City.

KANSOO', or **KANSU**, an inland province in the north of China; area, 86,608 sq. miles. Pop. 5,411,188.

KANT, Immanuel, a celebrated German philosopher, the founder of the "critical" or Kantian philosophy, born at Königsberg, Prussia, 1724, died at the same place 1804. It is impossible within our space to give anything like an exposition of the philosophy of Kant, which has profoundly influenced all sub-

sequent philosophical speculations. Dissatisfied with the dogmatism of Wolff and the scepticism of Hume, he set himself to investigate the field of metaphysics for himself, and in the first place proceeded to the examination of the origin, extent, and limits of human knowledge. According to him, part of our knowledge is knowledge *a priori*, or original, transcendental, and independent of experience; part of it is *a posteriori*, or based on experience. What he calls the "pure reason" has to do with the former. His great work named the *Critique of Pure Reason* (first edition, Riga, 1781), contains the foundation for his whole system of philosophy. In the preface to a later work, the *Critique of the Power of Judgment* (Berlin, 1790), he defines "pure reason" thus: Pure reason is the faculty to understand by *a priori* principles; and the discussion of the possibility of these principles, and the delimitation of this faculty, constitutes the critique of pure reason. In the first rank of such ideas as we do not derive from experience are space and time. Kant shows that all our perceptions are submitted to these two forms, hence he concludes that they are within us, and not in the objects; they are necessary and pure intuitions of the internal sense. The three original faculties, through the medium of which we acquire knowledge, are sense, understanding, reason. Sense,



Immanuel Kant.

a passive and receptive faculty, has, as already stated, for its forms or conditions space and time. Understanding is an active or spontaneous faculty, and consists in the power of forming conceptions according to such categories as unity, plurality, causality, etc., which categories are applied to objects of experience through the medium of the two forms of perception, space and time. Reason is the third or highest degree of mental spontaneity, and consists in the power of forming ideas. As it is the province of the understanding to form the intuitions of sense into conceptions, so it is the business of reason to form conceptions into ideas. Far from rejecting experience, Kant considers the work of all our life but the action of our innate faculties on the conceptions which come to us from without. He proceeds in a similar way with morality; the idea of good and bad is a necessary condition, an original basis of morals, which is supposed in every one of our moral reflections, and not obtained by experience. He treats this part of his philosophy in his *Critique of Practical Reason* (1788).

KA'OLIN, a name first given by the Chinese to a pure white clay used by

them in the manufacture of porcelain. Kaolin is the result of the decomposition of granitic rock, containing felspar, mica, and quartz. Similar clays, differing slightly in color and in the percentage of constituents, are found at Schneeberg in Saxony, furnishing the material of Dresden china; at Limoges, in France, employed for Limoges ware; and at St. Austell, in Cornwall, the source of supply for the British potteries. It is also found in Nebraska and some of the eastern states. In its natural state kaolin somewhat resembles mortar; by sorting and repeated filtration it is freed from all coarse ingredients, then dried in pans and sheds, and sent into the market cut into blocks.

KAPURTHALA (ka-pört'ha-la), native state of India, province Punjab; area 598 sq. miles; pop. 299,690. The capital, Kapurthala. Pop. 17,000.

KARAM'SIN, Nicolai Michailovitch, imperial Russian historiographer, born in a village of the government of Orenburg in 1765, died at St. Petersburg 1826. His title to fame rests on his *History of the Russian Empire* (12 vols., St. Petersburg, 1816-24), a work written in fine style, with impartiality and penetration, and translated into several other languages, including an English edition.

KARAULI', a town of India. Pop. 23,124.—The state, which is under the superintendence of the Bhurtapore and Karauli agency, has an area of 1208 sq. miles, and a population of 148,670.

KARLSBAD. See Carlsbad.

KARNAK. See Thebes.

KARNAL (kar-näl'), an Indian town and district, in the Punjab; area of district, 2396 sq. miles; pop. 683,718. Karnal, the headquarters of the district, trades largely with Delhi and Umballa. Pop. 23,559.

KARNUL', or **KARNOOL'**, a town in India, in the presidency of Madras, situated in the fork formed by the junction of the Hundri with the Tungabhadra, with a dismantled fort. Pop. 25,376.—The district has an area of 7514 sq. miles; a pop. of 817,811.

KARS, a town on the Russo-Turkish frontier in Asia. Captured and annexed by the Russians in November, 1878, it has become the capital of a Russian province of the same name; area, 7175 sq. miles, pop. 292,498. It has since been connected with Batoum and Tiflis by military roads, and the fortifications have been much enlarged and strengthened. Pop. 20,891.

KASHGAR', a Chinese town of Central Asia, in Eastern Turkestan on a river of the same name, with considerable manufactures of cotton, linen, gold and silver cloths, carpets, etc., and an extensive trade, its position at the junction of several great routes making it the emporium of much of the commerce of Central Asia. Pop. estimated at from 40,000 to 80,000.

KAS'SON, John Adam, an American diplomat, born in 1822 at Charlotte, Vt., of Irish ancestry. In 1857 he removed to Iowa, where he entered politics, and in 1860, as chairman of the republican state committee, managed the Lincoln campaign, and was appointed first assistant postmaster-general. In 1863 he was sent as United States commissioner

to the first international postal congress at Paris. From 1863 to 1867 he was a republican member of congress from Iowa. From 1873 to 1877 again sat in congress. In 1877 appointed minister to Austria-Hungary by President Hayes. He returned to America in 1881, was again sent to congress, was reelected in 1883. President Arthur, in 1884, appointed him minister to Germany, where he served also as the United States representative at the international Congo conference at Berlin. In 1887 he was president of the international constitutional centennial commission at Philadelphia, and in 1889 was chairman of the United States commission to the international Samoan conference at Berlin. In 1897 he was appointed commissioner plenipotentiary to negotiate reciprocity treaties with foreign powers under the provisions of the Dingley act. In 1898 he was a member of the American-Canadian joint high commission.

KA'TYDID, a species of grasshopper of a pale green color, body about an inch long, found in some parts of North America, and so named from the sound of its note. This is produced by the friction of the taborets in the triangular overlapping portion of each wing-cover against the other, and is strengthened by the escape of air from the sacs of the body, so as to be heard on a quiet night at a quarter of a mile distance. The females are noiseless.

KAULBACH (koul'bäh), Wilhelm von, one of the greatest of modern German painters, born at Arolsen, Waldeck, in 1805; died at Munich of cholera in 1874. The desire of King Ludwig of Bavaria to make Munich the center of German art afforded free scope for his genius, and he was long engaged in the decoration of



W. von Kaulbach.

the Hofgarten, the Odeon, the palaces of Maximilian and Ludwig, and the new Pinacothek, for which he did the series of designs of contemporary groups of artists, architects, etc., executed in fresco on the exterior. His most ambitious pictures, with the exception of the *Madhouse* (1828), are to be found in a series (utilized in the decoration of the Berlin Museum) seeking to depict the progress of the human race in typical scenes from the great historic periods and comprising the Tower of Babel, Age of Homer, Destruction of Jerusalem, Battle of the Huns and Romans, the Crusades, and the Reformation (1834-63). Besides these, however, he left a large number of portraits, designs,

and illustrations of books, including the Reineke Fuchs, the Gospels, and the works of Shakespeare, Goethe, and Schiller.

KAZAN', a city of European Russia, capital of the gov. of same name, situated on the Kasanka, about 4 miles above its junction with the Volga. Pop. 140,726.—The gov. is surrounded by the governments of Viatka, Orenburg, Nijni-Novgorod, and Simbirsk; area, 24,601, pop. 1,992,985.

KEAN, Charles John, actor, son of the celebrated Edmund Kean, born at Waterford 1811, died at London 1868. He was educated at Eton, but being thrown on his own resources in 1827 he took to the stage, and made his debut at Drury Lane as Young Norval. He married the accomplished actress Ellen Tree in 1842, and in 1851 became sole lessee of the Princess' Theater, London, where he put some of Shakespeare's plays on the stage with a splendor never before attempted. He inherited little of his father's genius, and his success was largely due to effective staging.

KEAN, Edmund, the most brilliant tragic actor of his age, was born in London in 1787, died at Richmond 1833. His parents were poor and connected in a low capacity with the theatrical profession. At two years of age he was placed in a pantomime, at seven he went to school, but ran away, and for a short time he was a cabin-boy in a vessel. Returning to the boards he ultimately obtained an engagement at one of the minor London theaters. When not yet thirteen years of age he managed to please his country audiences as Hamlet, Cato, etc., and in Windsor he gained the applause of the royal family in Richard III. He married Miss Chambers, an actress in his company, in 1808. In 1814 he appeared at Drury Lane first as Shylock and then as Richard III. His success was sudden and unexampled, and was equally great in other parts, including Othello, Hamlet, Macbeth, Iago, Lear, etc. Visits to the provinces, to Paris, and the United States brought him fresh fame and profit.

KEARNEY, Denis, American labor agitator, was born in Oakmont, Ireland, in 1847. In 1877 he began to incite the laboring men of San Francisco against the wealthier classes; great meetings were held on the "Sand Lots" near the city, where Kearney ruled supreme, and soon attracted attention by his savage attacks upon capital, Chinese labor, and various other alleged grievances. His influence rapidly increased, until his adherents were strong enough to pack a constitutional convention and force the adoption of a new state constitution which was largely in their own interest and was most detrimental to capital and vested interests generally. His followers, however, gradually drew away from him and he himself soon relapsed into insignificance. He died in 1907.

KEARNY, (kär'ni), a town in Hudson co., N. J., on the Passaic river, opposite Newark, and on the Erie and other railroads. It is a residential suburb of Newark and New York. Pop. 12,302.

KEARNY, Phillip, American soldier, was born in New York City in 1815.

In 1837 he entered the United States army as lieutenant in the first dragoons, and two years later was one of three officers sent by the United States government to study the French cavalry service. In 1840 he was then successively aide-de-camp to General Macomb, general in chief of the United States army from 1840 to 1841 and to General Scott from 1841 to 1844. In 1859 he entered the French army as a volunteer in the Italian war and for his conspicuous bravery throughout the campaign he received the cross of the Legion of Honor. He returned to the United States and in 1862 was placed in command of the army of the Potomac. He was in the battles of Williamsburg and Seven Pines, and in 1862 was commissioned major-general of volunteers. He subsequently participated in the second battle of Bull Run and on September 1, 1862, was killed at Chantilly while reconnoitering.

KEATS, John, English poet, was born in London 31st October, 1795; died at Rome 24th February, 1821. His first volume of poems came out in 1817. Endymion, a Poetic Romance, appeared in 1818; his last volume of poetry containing Lamia, Isabella, The Eve of St. Agnes, Hyperion, and other poems



John Keats.

in 1820. Keats charms by his love of nature, his keen sensuous perception, and his sweet harmony; but his beautiful thoughts are often hidden by wild fancies, while errors of taste and faults of diction abound in his poetry. But his later works are free of many of the faults of the earlier productions, and place him in the front rank of the poets of his age.

KE'BLE, John, an English divine and poet, born 1792, died 1866. His reputation is chiefly due to his well-known volume of hymns, The Christian Year. He also wrote Lyra Innocentium, a series of poems on children, Sermons, etc. Keble College, Oxford, was established in honor of his memory.

KE'BLE COLLEGE, one of the colleges of Oxford University, built by subscription as a memorial of the Rev. John Keble, and incorporated in 1870 by royal charter.

KECSKEMET (kech'ke-met), one of the largest market towns of Hungary, 50 miles southeast of Budapest. Pop. 56,951.

KEDGE, a small anchor used to keep a ship steady and clear from her bower anchor, while she rides in a harbor or

river, also in removing her from one part of a harbor to another. See Anchor.

KEEL, the bottom timber in a wooden vessel which forms the main support and connection of the whole fabric. It is generally composed of several thick pieces of timber placed lengthways, scarfed and bolted together. A piece bolted to the bottom of the keel is called the false keel, and an internal piece, also bolted to the keel, is called the keelson. In iron vessels the arrangement of parts is altogether different.

KEELEY, Leslie, American physician born in St. Lawrence co., N. Y., in 1836. In 1880 he opened a sanitarium at Dwight, Ill., for persons addicted to the immoderate use of liquor and opium. His success was so great that he opened similar institutions in different parts of the country. His cure consists of a secret preparation containing bichloride of gold, and he claimed that 95 per cent of the patients treated were permanently cured. He died in 1900.

KEELEY MOTOR, a machine claiming to furnish power at a minimum expenditure of energy. Its inventor, John W. Keeley, who was born in Philadelphia in 1837, and died there in 1898, made startling claims for the success of his motors. Various exhibitions were given with remarkable features but the promised developments never appeared and after the inventor's death the fraud was thoroughly exposed, it being shown that the force was supplied by a hidden compressed air apparatus.

KEENE, the county seat of Cheshire co., N. H., 43 miles southwest of Concord; on the Ashuelot river, and on the Boston and Maine railroad. Pop. 10,425.

KEENE, Laura, the stage name of Miss Mary Moss, an actress, born in 1820 in England. Her greatest success before coming to this country was as Pauline in The Lady of Lyons. Her most celebrated production was Our American Cousin, which she brought out in 1858, with Joseph Jefferson as Asa Trenchard and E. A. Sothorn as Lord Dundreary. She afterwards toured with it, and it was during one of her presentations of this play in 1865 that President Lincoln was assassinated. She died in 1873.

KEEWAT'IN. See Kewatin.

KELLER, Helen Adams, an American girl remarkable for her intellectual accomplishments acquired in spite of being deaf, dumb, and blind, was born in 1880 in Tusculum, Ala. When nineteen months old she was attacked by scarlet fever, which left her without the senses of sight and hearing. When eight years old she was placed under the care of Miss Anna Sullivan, and from that time her progress was remarkable. When she had learned to read and write and to use the finger alphabet, she determined that she would learn to speak, and so rapid was her progress that in less than a month she was able to talk intelligibly. After studying for some years she entered Radcliffe College in 1900 and graduated in 1904. She contributes to a number of magazines and is the author of The Story of My Life.

KELLY, John, American politician, was born in New York City in 1821. He became a member of the Tammany General Committee in 1849; and in 1854

was elected alderman from the fourteenth ward. He served in congress from 1855 to 1858. From 1872 to 1884 he was dictator of the Tammany organization. He was appointed comptroller by Mayor Wickham, but was subsequently removed by Mayor Cooper. In 1884 made a stubborn but unsuccessful effort to prevent the nomination of Grover Cleveland for the presidency. He died in 1886.

KELP, in commerce, the crude alkaline substance obtained by burning seaweeds. The sea-weed is gathered during the summer, dried on the shore, then stacked under shelter for some weeks until it becomes covered with a white saline efflorescence, when it is ready for burning, which is effected in a round



Kelp, or devil's apron.

brick-lined pit, or oblong kiln. As the weed softens, it is well stirred with a heated iron until it becomes a semi-fluid mass; it is then cooled and broken into pieces ready for the market. Kelp is now chiefly used for the production of iodine and chloride of potassium; a ton of kelp yields about 8 lbs. of iodine.

KELTS. See Celts.

KELUNG', a town and seaport now belonging to Japan, in the northern part of the island of Formosa. Pop. 70,000.

KELVIN, Lord. See Thomson, Sir William.

KEMBLE, Charles, English actor, born 1775, died 1854, a younger brother of John Phillip Kemble. He married the favorite actress Miss de Camp in 1806, by whom he was the father of John Mitchell Kemble, Frances Anne Kemble, and Adelaide Kemble.

KEMBLE, Frances Anne, popularly known as Fanny Kemble, writer and actress, eldest daughter of Charles Kemble, and niece of Mrs. Siddons, was born at London 1809. Her father being in financial difficulties she was induced to appear on the stage, which she did in 1829 at Covent Garden as Juliet, and her success was so great that in the course of three years she managed to relieve the fallen fortunes of the family. Her trip to America in company with her father was also a splendid triumph. She returned to London in 1847, and from that time resided alternately in America, England, and the Continent, appearing at intervals as a public reader. She died in 1893. As an actress she excelled in the characters of Portia, Beatrice, Lady Macbeth, Lady Teazle, and of Julia in the Hunchback.

KEMBLE, John Phillip, one of the most eminent tragedians of the British stage, born at Preston 1757, died at Lausanne 1823. He selected the stage as a profession, made his first appearance at Drury Lane in 1783, and became at once popular. He was afterward manager of this theater in 1788-1802.

From 1801 to 1803 he made a most successful tour in France and Spain, and on his return to London purchased a share in the Covent Garden theater, and made himself a splendid reputation in the characters of Julius Caesar, Hamlet, Macbeth, Coriolanus, etc. His statue was placed in Westminster Abbey in 1833. His acting was distinguished for dignity, precision, and studious preparation, but was wanting in fire and pathos. His sister, Sarah, was the celebrated Mrs. Siddons.

KEMPIS, Thomas A. See Thomas à Kempis.

KENILWORTH, a town of England, in Warwickshire. Kenilworth Castle, now a magnificent ivy-covered ruin, was founded in the reign of Henry I. The gorgeous entertainment given here in 1575 to Queen Elizabeth by the Earl of Leicester is familiar to all from Scott's romance of Kenilworth. Pop. 4544.

KEN'NAN, George, American journalist and traveler, was born at Norwalk, Ohio, in 1845. In December of 1864 he began his travels by a journey to Kamtchatka. In 1870 he explored the eastern Caucasus, Daghestan, Chechnia, and the course of the Volga to the Caspian; again in 1885-86 he made a journey of 15,000 miles through Northern Russia and Siberia, investigating the convict, prison, and exile system, and exploring the Russian Altai. He was expelled from the Russian Empire while carrying on further social and political studies there in 1901. In 1902 he went as correspondent for a New York newspaper to the island of Martinique, after the devastating eruptions of Mont Pelée, and climbed the still active volcano, which he describes in his book *The Tragedy of Pelée*. In 1904 he went to Japan to describe the Russian-Japanese war.

KENNEBEC, a river of the United States, Maine, rises in Moosehead Lake, and after a course of 150 miles, mostly e.s.e., empties itself into the Atlantic 12 miles below Bath. It is navigable for ships as far as Bath, for steamers to Hallowell, 40 miles.

KENOSHA, capital of Kenosha co., Wis., on Lake Michigan, and the Chi. and N. W. railway; 34 miles s. of Milwaukee, 52 miles n. of Chicago. It has an excellent harbor. It is in a dairy and agricultural region, and manufactures carriages, wagons, furniture, and other wooden goods. Pop. 13,960.

KENT, a maritime county of England, forming the southeast extremity of the kingdom; area, 995,392 acres, of which nearly the whole is arable, meadow, or pasture. Pop. 1,351,849.

KENT, James, an eminent American jurist, born 1763, died 1847. He was educated at Yale College, studied law, and was admitted an attorney in 1785. After practicing at Poughkeepsie he settled in New York, and became professor of law at Columbia College (1794-98). He was successively appointed master in chancery, recorder, judge of the supreme court, chief justice (1804-14), and latterly chancellor of New York (1814-23). He again accepted the law professorship at Columbia College in 1824-25. His *Commentaries on American Law* (1826-30) at once became a

standard work, while his decisions were quoted in the courts as of the highest authority.

KENTON, Simon, American pioneer, was born in Fauquier co., Va., in 1755. At the age of eighteen he came in contact with Simon Girty and other traders, hunters, and backwoodsmen, and eventually he joined Daniel Boone as a hunter and explorer. Later, he was employed by the colonial governor, Dunmore, as a spy, and among other daring exploits saved the life of Boone. In 1778 he joined Gen. George R. Clark at the falls of the Ohio, and was with him at the surprise of Kaskaskia. He was captured by the Indians during that year and taken prisoner to the British commander at Detroit, from whom he escaped. In 1782 he visited his native place, and in 1784 went back with his parents to Kentucky, settling near Maysville. Thereafter he was actively engaged in conflicts with the Indians until peace was established in 1793. Previously Kenton had been promoted major. In 1805 he became brigadier-general of Ohio militia and in 1813 fought at the battle of the Thames. In 1824 he appeared in Frankfort, Ky., before the legislature, in tattered garments, petitioning for relief, which was granted, and an annual pension of \$240 procured for him from congress. He died in 1836.

KENTUCKY, one of the United States, bounded n. by Ohio and Indiana, n.w. by Illinois, w. by Missouri, s. by Tennessee, and e. by Virginia and West Virginia; area, 40,400 sq. miles. The surface of the state is gently undulating, excepting the southeast, which is somewhat mountainous. Few states are better provided with water communication. The Ohio forms the boundary on the north, and receives from within the state numerous tributaries, of which the most important are the Cumberland, Kentucky, and Tennessee; the Mississippi, after receiving the Ohio, forms the boundary on the west. The climate is salubrious, the soil fertile, the principal crops being wheat, Indian corn,



Seal of Kentucky.

but oats, barley, hemp, and fruit are extensively raised.

Kentucky is densely wooded, except in those places that are under cultivation; at present about two-thirds of the state is covered with virgin forest. Among the prevailing species of trees are the blue ash, black walnut, various kinds of oak, the pine, maple, tulip

tree, and sweet gum. Some cotton is raised west of the Tennessee River. Potatoes and hay are important crops. Kentucky is the principal tobacco-producing state in the Union.

It has always been a center for rearing domestic animals, and for breeding the finest grades of stock. A large percentage of the successful race horses of the United States have been bred in Kentucky. The peculiar advantages for stock raising are due in part to the excellent quality of the grass, and in part to the mild, salubrious climate, which permits the cattle to remain unhoused in the pastures during the greater part of the winter.

Kentucky is rich in coal, iron ore, and fire clay. The coal measures cover an area of more than 10,400 sq. mi. with elevation ranging from 650 to 1,400 feet, and are the result of several alternate exposures and submersions. They average at least ten good beds of coal. The eastern coal field is a prolongation of the Appalachian deposits. The western belongs to the Illinois tract. The coal is bituminous, and some excellent cannel occurs. Next in importance to coal are the iron ores, which are of excellent quality, and are found throughout a district of 20,000 sq. mi. in extent. Galena is found in some sections; valuable building stone occurs almost everywhere; and salt is obtained by boring in the coal and oil regions.

The state has a good school system and many colleges and institutions for higher education. Kentucky University, located at Lexington, was founded in 1798. There are separate schools for colored pupils.

The chief manufacturing industries comprise tobacco, cotton and woolen factories, iron-works, and tanneries. The central position of the state, and the abundant water and railway communication, have secured it a rapid commercial development.

Kentucky was originally a portion of Virginia. In 1769 Daniel Boone and five companions from the Yadkin settlements came to eastern Kentucky, but it was not until 1774 that the first effort to plant a colony was undertaken. It was located in what is now Mercer Co., and was given the name of Harrodsburg. In 1775 Daniel Boone planted a settlement to which he gave the name of Boonesborough. In 1774 a Virginian force administered a crushing defeat to the Northwestern Indians at Point Pleasant, and forced them to retire beyond the Ohio. In 1776 by act of the legislature, the country was organized under the name of Kentucky co., with Harrodsburg as the county seat, and with separate representatives in the Virginia legislature. In 1782 a desperate battle with the Indians was fought at the Blue Lick Springs, resulting in the defeat of the whites and the death of over sixty of their men, about one-tenth of the fighting population. By this time agitation for separation from Virginia and independent state government was well under way. In 1784 and 1785 conventions were held at Danville to discuss the question but it was not until 1792 that Kentucky was admitted to the union.

In April, 1792, a convention met at Danville and adopted a constitution of government; Isaac Shelby was chosen as the first governor; and, after a spirited struggle, Frankfort was chosen as the capital. In July, 1799, a new constitution was adopted which made the governor and other state officers elective by the people instead of by electors. In the war of 1812 Kentucky took a distinguished part. Seven thousand volunteers, far more than Kentucky's quota, offered their services, and her troops fought gallantly in most of the battles in the northern part of the United States and in Canada, and about one-fourth of Jackson's army at New Orleans consisted of Kentucky riflemen. In the Mexican war, as in the war of 1812, Kentucky took an honorable part. Although her quota was but 2400, more than 10,000 volunteered and Kentucky troops participated in most of the battles fought on Mexican soil. In 1850 a new constitution was adopted which made all judges and county officers elective.

Upon the outbreak of the civil war Kentucky attempted to maintain a position of neutrality, but the geographical position of the state rendered the scheme impossible. The governor rejected President Lincoln's call for troops, and when the confederate and union armies began to pour into the state from opposite directions formal demands were made for their withdrawal. The union armies soon took possession, and by 1862 the confederate forces had evacuated the state. Kentucky furnished more than 90,000 troops to the union army, and 40,000 to the confederacy. Kentucky escaped from the carpetbag and military régimes, the civil authority having been reestablished in October, 1865. In national elections Kentucky was a democratic state from the date of its admission till the formation of parties about 1828. It voted for Clay in 1824 and for Jackson in 1828, but from this time till 1852 it was one of the strongest whig states. It cast its vote for Buchanan in 1856 and for Bell in 1860. Since that time it has been democratic with the exception of the year 1896, when it cast 12 of its electoral votes for Mr. McKinley and one for Mr. Bryan. The seat of government is Frankfort, a comparatively small place; the oldest town is Lexington; but the largest and most important is Louisville.

At the head of the higher institutions of learning are the Kentucky University at Georgetown, the Kentucky State Agricultural and Mechanical College at Lexington, and a number of denominational colleges and universities. Pop. 1909, 2,250,000.

KENTUCKY RIVER, a river of the United States, rises in the Cumberland Mountains, traverses the state of Kentucky, and after a course of 260 miles flows into the Ohio at Carrollton. By a series of improvements the lower portion has been rendered continuously navigable for steamers.

KENTUCKY STATE AGRICULTURAL AND MECHANICAL COLLEGE, a non-sectarian, coeducational institution at Lexington, Ky., established in 1865, and reorganized in 1880 under its present

title. It offers preparatory, collegiate, engineering, scientific and agricultural courses leading to the bachelor's degree. Connected with the college is an agricultural experimental station, with a farm of 48 acres.

KENTUCKY UNIVERSITY, an institution of higher learning chartered in 1837 as Bacon College at Georgetown, Ky. It was removed to Harrodsburg in 1839, and in 1858 was reorganized as Kentucky University under an amended charter. It was consolidated with Transylvania University founded in 1783 and took possession of that institution's property at Lexington. The university comprises four colleges; The College of Liberal Arts, the College of the Bible, and the Commercial College, at Lexington; and the Medical Department at Louisville. Of these the Commercial and Liberal Arts departments are open to women. The Kentucky Agricultural and Mechanical College was one of the colleges of the university from 1865 until 1878, when it began an independent existence. The university is under the control of the Disciples of Christ.

KE'OKUK, a town in Iowa, at the foot of the lower rapids of the Mississippi 2 miles above the confluence of the Des Moines. It is an important business center, and has numerous flour and saw mills, foundries, pork-packing establishments, etc. Pop. 17,345.

KEPLER, Johann, a great German mathematician and astronomer, born 1571, near Weil (Würtemberg), died at Ratisbon 1630. He studied at the University of Tübingen, and in 1593 he was appointed a teacher of mathematics at Gratz (Styria). Here he devoted himself with much ardor to the study of astronomy; but in 1599 the religious persecutions commenced in Styria, and Kepler, being a Protestant, gladly accepted Tycho Brahe's invitation to Prague, to assist in the preparation of the new astronomical tables, called the



Johann Kepler.

Rodolphine Tables. Tycho died in 1601, and Kepler continued the work alone, being appointed imperial mathematician and astronomer. After twenty-five years' incessant labor the tables were published in 1627 at Ulm. Kepler had become the happy possessor of all Tycho's papers, and the mass of observations made by that astronomer during twenty years, with a precision till then unsurpassed, enabled Kepler to establish his three laws which have proved so fruitful in the development of astronomical science. He wrote much, but the

work that has rendered him immortal is his *New Astronomy*, or *Celestial Physics* delivered in *Commentaries on the Motions of Mars*; Prague, 1609, folio.

KEPLER'S LAWS, in astronomy, three laws discovered by Kepler on which were founded Newton's discoveries, as well as the whole modern theory of the planets:—1. Every planet describes an ellipse, the sun occupying its focus. 2. The radius vector (line joining the center of the sun with the center of the planet) of each planet sweeps over equal areas in equal times. 3. The squares of the periodic times (the periods of complete revolution round the sun) of two planets are proportional to the cubes of their mean distances from the sun. These laws enabled Newton to determine the laws of the attraction of gravitation.

KEPPLER, Joseph, American cartoonist, was born in Vienna in 1838. In 1868 he came to the United States and went to St. Louis, where he established the *German Puck*, the failure of which caused him to move to New York, where he was employed as caricaturist for Frank Leslie's *Illustrated Newspaper* from 1872 to 1877. In 1875 he started another *German Puck*, in partnership with Adolph Schwartzman. The colored political cartoons of this paper became famous, and in 1877 the English edition appeared. He was the first artist to introduce colored cartoons. Died, 1894.

KERGUELEN'S LAND, Kerguelen Island (ker'g'len), an uninhabited mountainous island in the Indian Ocean about midway between the Cape of Good Hope and Australia, discovered by the French navigator Kerguelen in 1772, annexed by France in 1893. It is of irregular shape, being much cut up by fjords and inlets and surrounded by islets; greatest length about 100 miles, highest summit 6166 feet. The scenery is picturesque and often magnificent; glaciers and snow-fields occupy a considerable area. The climate is wet and stormy, the temperature never very high nor very low. The island is only occasionally visited by whalers and sealers. Cook visited it in 1777, Ross in 1840, the *Challenger* Expedition in 1874, and in 1874-75 parties from Britain, Germany, and the United States were stationed here to observe the transit of Venus.

KERMAN', **KIRMAN'**, or **SIRGAN**, a town in Persia, capital of a province of the same name. Pop. estimated at 40,000. The province of Kerman, in the southeast of Persia, has an area of 50,000 sq. miles and a population of 600,000.

KERN, **JOHN WORTH**, born at Alto, Ind., Dec. 20, 1849; elected Supreme Court Recorder in 1885; elected state senator in 1892; Democratic candidate for governor in 1900 and 1904, but defeated; nominated for vice president of the United States by Democratic National Convention at Denver in 1908.

KER'OSENE, an illuminating oil obtained by refining crude petroleum. The bulk of kerosene is supplied by the United States and Russia. America controlled the kerosene market for many years, but Baku, on the Caspian, has now become a formidable rival, not only driving American kerosene out of the

Russian market, but also supplanting it in other countries. See *Petroleum*.

KER'RY, a maritime county of Ireland, on the southwest coast, in the province of Munster; area, 1,185,918 acres, of which about one-tenth is under tillage. The coast is much indented by bays and inlets (Dingle Bay, Kenmare river, etc.); the interior presents much fine scenery, including the picturesque lakes of Killarney. Iron ore, copper, and lead exist, and a superior kind of slate and flagstone are obtained in great quantities in the island of Valentia. Pop. 165,331.

KER'SEYMERE, or **CASSIMERE** (from the town Cashmere), the name given to a light fabric woven from the finest wools, principally in the west of England, and at Elbeuf, France. It is chiefly used for ladies' jackets and gentlemen's gaiters.

KESTREL, or **WINDHOVER**, a species of the falcon tribe, widely distributed in Europe. It is remarkable for its habit of remaining suspended in the air by means of rapid wing motion, being at this time on the look-out for mice, which



Kestrel.

are its chief food. At times it will also eat small birds, and insects frequently. It varies from 12 to 15 inches in length; it nests in trees, also in old towers and buildings, and often utilizes an old crow's nest. In winter it migrates to North Africa and India.

KETCHUP, or **CATSUP**, a pungent sauce employed as a seasoning for gravies, meat and fish. It was formerly prepared from mushrooms only, but numerous other products are now used for the same purpose. The best ketchup is obtained from mushrooms, walnuts, and tomatoes.

KETTLE-DRUM, a metallic kettle made of copper with a head of vellum lapped over an iron ring, and fitted outside of the kettle. By means of screws the head may be tightened or loosened. The drums are played by means of a



Kettle-drums.

mallet covered with felt or leather. By means of the screws the instruments can be tuned. In modern orchestras there are generally three kettle-drums, tuned in the tonic, dominant, and subdominant. The larger of the two drums is tuned

in F, the smaller in Bb. By means of a pedal any interval within a perfect fifth can be obtained; so that the larger drum can produce all tones between F and c, and the smaller all tones between Bb and f, giving the performer the possibility of producing any chromatic interval between F and f. The chief use of the kettledrum is to emphasize rhythmic figures.

KEWANEE (kê-wā'nê), a city in Henry co., Ill., 50 miles north by west of Peoria; on the Chicago, Burlington and Quincy railroad. Pop. 10,145.

KEWATIN (kê-wat'in), or **KEEWATIN**, a large Canadian territory under the jurisdiction of Manitoba, and stretching from Manitoba and Ontario to Hudson's Bay. The country is not much opened as yet; it is mostly densely wooded, and in many parts swampy, but rich in minerals, and game abounds. With a view to open up a new route via Hudson's Bay a railway through the territory has been begun.

KEW-KIANG, or **KIU-KIANG**, a town and seaport of China, province Kiangsi, on the south bank of the Yang-tse-kiang. The port was opened to foreign trade in 1862, when the population was 10,000; it is now over 50,000.

KEY, or **KEY-NOTE**, in music, the principal or fundamental note or tone, to which the whole of a movement has a certain relation, to which all its modulations are referred and accommodated, and in which it generally both begins and ends. See *Music*.

KEY, Francis Scott, American lawyer, was born in Frederick co., Md., 1780. During the attack of the British on Baltimore in 1814, he watched the progress of the bombardment of Fort Henry, the defense of Baltimore from the British ship, to which he had been sent on an errand under a flag of truce, during the night, and in the morning, seeing the Stars and Stripes still waving triumphantly, composed his famous song, *The Star Spangled Banner*. This was at once printed and became almost instantly popular, and is to-day perhaps the favorite heroic song of America. He died in 1843.

KEYBOARD, a frame containing a set of keys, placed in the front part of the pianoforte or organ. The natural keys are of wood covered with white ivory and the raised keys, touched to produce sharps and flats, are blocks of ebony or other hard black wood. The earliest keyboard of which we have record was that of the hydraulic or water organ, a Greek invention of the second century. In this the keys, eighteen in number, were all level. Strange to say, the principle of the balanced key, which had to be rediscovered in the 17th century, was then well known. Our modern chromatic keyboard was in use as early as 1361, though the keys were so large that they had to be struck with the fist. Their width was, however, gradually lessened, and in the spinet made by Pasi, of Modena, in 1490, and in the organ of Saint Blaise at Brunswick (1499), the compass was approximately that of our present keyboard. In most of the early instruments the natural notes are black and the sharps and flats white. The principal objection to all rearrangement

is the fact that there is a mass of beautiful music, written for the modern pianoforte, which could not be adapted to an improved instrument.

KEY-STONE, in architecture, the last put in stone of an arch or vault, which locks or keys the whole together, whence the name. See Arch.

KEY WEST, a small, low-lying coral island south of Florida, 60 miles s.w. of Cape Sable, and commanding the entrance to the Florida Passage and the Gulf of Mexico.

KEY WEST CITY, a port of entry and military station of the United States, has a safe and accessible harbor defended by a fort. Pop. 20,406.

KHAN, a title given by Tartars, Persians, and other eastern nations to princes, chieftains, commanders, and governors, but now generally reserved for governors of cities and provinces, these provinces being called khanates. Khan is also another term for caravan-sary, of which there are two kinds; one for pilgrims and travelers, with gratuitous entry, another, more commodious and with locked apartments, for traders, subject to a nominal charge.

KHANDESH (khān-dāsh'), a district of British India, Bombay presidency; area, 10,907 sq. miles; pop. 1,460,851.

KHARKOFF (hār-kof'), or **CHAR-KOV**, a government of the south of Russia; area, 21,041 sq. miles; pop. 2,243,643. The capital, Kharkoff, has a considerable trade in cattle, grain, etc. and manufactures beet-sugar, soap, candles, and leather. A bed of coal of immense extent in its vicinity is doing much to foster industries. The University of Kharkoff is an important educational center. Pop. 195,000.

KHARTOUM (hār-tōm), a town in the eastern Soudan, on the left bank of the Blue Nile, near its junction with the White Nile. Having sprung up since 1830, it became the capital and largest town in the Egyptian Soudan, and a great emporium of trade. It was the scene of Gordon's heroic defense and death in fight against the Mahdists in 1885. Latterly the adjacent Omdurman supplanted it, but it is again reviving, and has become the seat of the Gordon College, for the Soudanese.

KHASI AND JAINTIA HILLS, an administrative district of Assam; area, 6157 sq. miles; pop. 197,904.

KHAT. See Catha.

KHATMANDU (khāt-mān-dō'), capital of the Kingdom of Nepal, in Northern India. Pop. about 50,000.

KHEDIVE (ke-dēv'), a word signifying lord, the title of the rulers of Egypt, originally granted by a firman from the sultan in 1866 to Ismail Pasha, then Vali or viceroy of Egypt.

KHERSON (her'son), or **CHERSON**, a maritime government of Southern Russia; area, 27,523 sq. miles; pop. 2,732,832.

KHIVA (hē'vā), or **CHIVA**, semi-independent khanate of Central Asia, forming part of Turkestan. The total population is about 500,000.—The capital, Khiva, lies on an alluvial flat at the junction of two canals, 50 miles west of the west bank of the Amu. Pop. about 20,000.

KHOKAND, or **KOKAND**, formerly independent khanate of Central Asia,

but since 1876 forming the province of Ferghāna in Russian Turkestan. Its present area is 29,650 sq. miles. The capital, Khokand, is situated on both sides of the Sir. Pop. 82,054.

KHORASAN (ho-rā-sān'), a province of Persia, bordering on Afghanistan; area, 140,000 sq. miles; pop. 860,000.

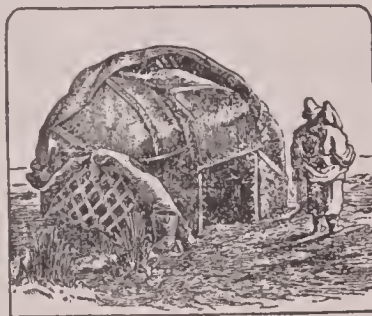
KHUZISTAN (hū-zis-tān'), or **ARAB-ISTAN**, a province of Persia; area, 38,600 sq. miles, pop. 500,000.

KHYBER (khī'bēr), a famous mountain pass between India and Afghanistan, the chief gate to the latter country from Peshawur, by means of which India has been invaded from time to time, and the scene of severe conflicts in the recent Afghan war. Its position renders it of the greatest importance to British India, and it is now under the jurisdiction of the lieut.-governor of the Punjab. It is 3373 feet above sea-level, about 50 miles long, and inclosed on each side by precipices from 600 to 1200 feet high.

KIANG-SI, one of the central provinces of China; area, 72,176 sq. miles; pop. 24,534,118.

KIANG-SU, the richest of the central provs. of China; area, 44,500 sq. miles; pop. 20,905,171. The chief port is Nanking.

KIBITKA, a tent of the nomad tribes of the Kirghiz Tartars. The frame consists of twelve stakes, each 5½ feet high, set up in a circle 12 feet in diameter, on which is laid a wheel-shaped roof-frame, consisting also of twelve stakes, united at one extremity but free at the other, so that the stakes radiate like spokes.



Kibitka or Kirghiz tent.

The whole is covered with thick cloth, made of sheep's wool, with the exception of an aperture in the center for the escape of smoke. The door is formed by the removal of a stake.—The name is also given to a carriage generally without springs, used by all classes in Russia, and which is covered by some kind of cover to afford protection from the weather.

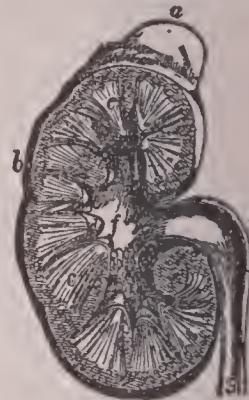
KIDD, William, a celebrated pirate, known as Captain Kidd, born about the middle of the 17th century, and originally a shipmaster of New York. In 1696 he was appointed captain of the ship *Adventure Galley* of thirty guns by William III., for the suppression of piracy. In America he collected some 150 recruits, sailed for the East Indies; took to pirating in the Indian Ocean, and returned with his booty to New York in 1698. He was arrested and arraigned in England for piracy; but the charge could not be brought home to him; he was then tried for the murder of one of his crew, sentenced and hanged,

in 1701. The story that he buried immense treasure on the shores of Long Island Sound, or the banks of the Hudson river, gave rise to one of Edgar Allen Poe's tales.

KIDNAPPING, the act of getting forcible and illegal possession of the person, an offense of varied degree, but always punishable by fine or imprisonment.

KIDNEY-BEANS. See French Beans.

KIDNEYS, two of the abdominal viscera, in the form of two glands, the function of which is to secrete the urine from the blood. They are situated one on each side of the vertebral column at



SECTION OF HUMAN KIDNEY.

a, Supra-renal capsule, resting above the kidney. b, Cortex or cortical portion of kidney. cc, Medullary portion, consisting of cones. dd, Apices of the pyramids, projecting into their corresponding calyces eee. f, Pelvis. g, Ureter:

the back part of the abdominal cavity on a level with the last dorsal and two upper lumbar vertebræ. The right kidney lies at a slightly lower level than the left. They are of the well-known "kidney-bean" shape. The concave side of each kidney is turned inward and toward the spine. The depression on the inner side is termed the hilum, and from this notch the excretory duct or ureter proceeds, while the blood-vessels of the kidney enter and leave the gland at this point. The weight of each male kidney is about 5 oz.; those of the female weigh each somewhat less. Each gland is covered by a thin sheath of fibrous tissue, which has no extension into the substance of the organ. The internal substance is divided into an outer deeper-colored cortical portion or cortex, and an inner lighter-colored or medullary portion. Both portions consist of tubes (tubuli uriniferi), which run a very tortuous course in the cortex, but continue as straight tubes in the medulla. The latter is formed into a series of conical fleshy masses, about twelve in number, called pyramids of Malpighi. These project into a cavity formed at the hilum by the expansion of the excretory duct, and called the pelvis of the kidney. Prolongations of the expanded ureter, called the calyces, invest the apices of the pyramids and dip in between them like funnel-shaped tubes. Now in the cortex the end of a tubule is dilated into a sac or capsule; into this a small branch of the renal artery enters, and then breaks up into a tuft of capillary blood vessels. This tuft is called the glomerulus, and it and its capsule form a Malpighian corpuscle

about $\frac{1}{20}$ th of an inch in diameter. So that a tubule, beginning at its dilated end, runs a tortuous course in the cortex, reaching the medulla becomes straight, and finally opens into the pelvis on the apex of a pyramid. The blood vessels of the kidney consist of the renal artery, derived from the aorta, and the renal vein. The branches of the artery enter the gland at the hilum, and pass into the substance of the gland between the papillae. Finally they reach the cortical portion, and therein subdivide into minute vessels, which form the glomeruli of the Malpighian bodies. The renal veins leave the kidney also at the hilum, and pour their contents into the great main vein of the lower parts of the body (vena cava inferior). The nervous supply of the kidney is derived from the renal plexus, and from the solar plexus or large sympathetic mass of the abdomen. The separation from the blood of the constituents of the urine is accomplished in the glomeruli, and by the uriniferous tubules, the former straining off the watery parts of the blood, while the latter remove the more solid matters. Gradually, the secreted urine passes through the tubules, into the pelvis of the kidney, thence into the ureters, which in turn open into the bladder behind its orifice or neck. The urine is constantly entering the bladder, drop by drop.

Inflammation of the kidneys is known as nephritis. Occasionally concretions of mineral substances accumulate in the kidney, and cause, in their passage from the gland and through the ureter, most excruciating pain.

KIEL (kēl), a town of Prussia, in Schleswig-Holstein, beautifully situated

canal it is now connected with the Elbe. Pop. 121,790.

KIELCE (ki-eltse), a government and town in Russian Poland; area of the former, 3897 sq. miles; pop. 763,746. The capital, Kielce, is an ancient town about 50 miles northeast of Crocow. Pop. 23,189.

KIEV (ki-ev'), or Kieff (ki-ef'), a government of s.w. Russia; area, 19,691 sq. miles; pop. 3,576,125. Kieff, the capital, is picturesquely situated on the right bank of the Dnieper, which is here navigable, and crossed by a suspension bridge half a mile in length, one of the finest in Europe. Its university is one of the most important of the empire. The connection by rail with Odessa and Kursk has done much to stimulate the trade of the town. Pop. 249,830.

KILAUEA, an active volcano in Hawaii, one of the Sandwich Islands. It has an oval crater, 9 miles in circumference, with a lake of red and boiling lava at the bottom, over 1000 feet below the crater's mouth.

KILDARE', an inland county of Ireland, in the province of Leinster; length, 40 miles; breadth, 27 miles; area, 418,496 acres. Pop. 63,469. The town of Kildare stands on an eminence 30 miles s.w. from Dublin.

KIL'IMA-NJARO (the Great Mountain), a double-peaked, snow-clad mountain of Africa, in the territory of the German East African Company, about 100 miles inland from the port of Mombasa, on the Suaheli coast. The highest peak, estimated at 19,270 feet, is the highest known in the African continent.

KILKEN'NY, a city, parliamentary borough, and county of itself, in Ireland, locally in Kilkenny county, of which it is the capital, 73 miles s.w. from Dublin, delightfully situated on both sides of the Nore. Pop. 13,242. The county, which is in the province of Leinster, has an area of 796 sq. miles. Pop. 79,159.

KILLAR'NEY, a market town of Ireland, in the county of Kerry, in the midst of beautiful scenery, within a mile of the celebrated lakes to which it gives its name. These lakes are three in number, the lower $4\frac{1}{2}$ miles long by 2 broad, the middle $1\frac{1}{2}$ miles long and $\frac{1}{2}$ broad, the upper 3 miles long. They are interspersed with wooded islands, and the lofty banks are also richly wooded. In summer Killarney is thronged with visitors. Pop. 5656.

KILMAR'NOCK, a parliamentary and municipal burgh of Scotland, in the county of Ayr, 19 miles s.w. from Glasgow. Pop. 34,165.

KILN, a structure of brick or stone used for drying, baking, burning, annealing and calcining various substances and articles, such as corn, hops, malt, cement, limestone, iron ore, glass, bricks, pottery, etc. The construction of kilns naturally varies with the special object for which they are designed, but the same principle is involved in all, that is, the generation of ample and regular heat with the least expenditure of fuel.

KILOGRAMME, a French weight containing 1000 grammes — 2.2 lbs. Similarly kilometer — 1000 meters or 0.621 miles. See Metrical System.

KILOGRAMMETER, a unit employed

in the measurement of mechanical work; it is the mechanical work expended in raising a body whose weight is 1 kilogramme (2.2046 lbs.) through the vertical height of 1 meter (3.2809 feet), and is equal to 7.233 foot-pounds. See Foot-pound.

KIM'BERLEY, the capital of Griqualand West, Cape Colony, and the center of the South African diamond fields. It is connected by rail with Port Elizabeth and Cape Town. There are four chief mines—Kimberley, Dutoitspan, De Beer's and Bultfontein. It successfully withstood a four months' siege by the Boers in 1899-1900. Pop. 28,643.

KIN. See Descent.

KINCARDINESHIRE, a maritime county on the east coast of Scotland; area, 248,284 acres. Pop. 40,918.

KIN'DERGARTEN, a German word signifying "children's garden," and the name given to a system of infant education introduced by Friedrich Froebel, who was largely assisted in its propagation by the Baroness Marenholz-Bülow. The system is intended to bring out the moral and intellectual capabilities of very young children chiefly by observation; pictures, toys, tools, etc., suitable for the purpose, being introduced, so as to convert schooling into play, which according to Froebel is the child's most serious business. The first kindergarten was opened in 1840 at Blankenburg (Prussia), and like most other innovations met at first with little encouragement, and even with opposition, but it gradually gained a footing in the best educated countries, and the progress in recent years has been great and rapid. Froebel Societies for the training of teachers exist now in various countries. The system is most widely spread in the United States and Belgium, while Switzerland, France, and Austria are grafting it on their elementary schools.

KINEMATICS, a branch of mathematics which treats of the motions of bodies independently of the forces which produce them.

KINETICS, that branch of the science of dynamics which treats of forces causing motion in bodies. See Dynamics.

KINETOSCOPE, a device for reproducing movable pictures from photographs, invented by Thomas A. Edison, in 1894. In shape it is a cabinet form, and the pictures are viewed from above through suitable lenses. The pictures come within the field of vision on a transparent film beneath which is an electric incandescent light. The result is an optical illusion, in that a series of pictures pass before the eye so rapidly that the effect is that of continuous motion. Thus a kinetoscopic view of a boxing match shows the boxers as though the observer were really looking at the originals through the small end of an opera glass.

The original protograph is taken by means of a specially arranged camera. In this camera the shutter is a slotted disk which is revolved by mechanism so as to open and shut 42 times a second. Back of the shutter is a continuous narrow film about two inches in width. This is arranged to run from one roller to another, so that one roller is giving off the film while the other is winding it up.



on a deep bay of the Baltic, 54 miles north by east from Hamburg. The most notable buildings are the university, and the royal palace (containing the university library). As a fortified naval port of Germany, with an imperial dockyard, and as the station of the greater part of the imperial fleet, Kiel is rapidly rising in importance. Besides ship building, it has iron foundries, engineering works, oil mills, tan works, tobacco works, etc. By the great ship-

The roller is such that a new sensitive area is exposed at every opening of the slotted shutter. In other words, 42 fields are exposed to the light and receive the image. This film is developed, and from that negative a continuous positive is printed by the usual photographic process with the modifications necessary to enable the photographer to handle the long, ribbonlike film. In the kinetoscope proper, this film passes before the object-glass at such a speed that lifelike motions are faithfully reproduced. The modifications of the kinetoscope for use in stereopticon exhibits are the cinematograph, veriscope, and vitascope. In these devices the ribbonlike film is made to pass before a calcium or electric arc-light. A series of photographs are enlarged by means of the ordinary stereopticon lenses, and thrown upon a sheet in a theater or hall, giving lifesize, lifelike continuous pictures. Such scenes as the charge of a cavalry squadron, prize fights, stage dancing, boxing, horses running, fast express trains, etc., have been reproduced by the kinetoscope.

KING, a person invested with supreme power over a state, nation, or people, whether this power be acquired by inheritance, election, or otherwise. It is difficult to define what essentially constitutes a king, or to say in what he differs from an emperor.

KING, Charles, American soldier and novelist, was born at Albany, N. Y., in 1844. He served in the artillery and cavalry; was retired as captain for wounds received in action (1879); was inspector and instructor of the Wisconsin National Guard (1882-89), colonel (1890), adjutant-general (1895), and brigadier-general, U. S. V. (1898). He afterward served in the Philippines. Among his best known books are *Famous and Decisive Battles*, *Campaigning with Crook*, *Between the Lines*, *The Colonel's Daughter*, *A War-Time Wooing*, *Kitty's Conquest*, *A Tame Surrender*, *Foes in Ambush*, *Fort Wayne*, *An Apache Princess*, *Medal of Honor*.

KING, Clarence, American geologist, was born in 1842. In 1863 he started on a trip across the continent. He arrived in California and became attached as assistant to the Geological Survey. His investigations included the determination of the age of the gold-bearing rocks, surveys of Mount-Whitney and the Yosemite Valley, and the collection of evidence in support of the glaciation of the Sierras. In 1879, he was appointed the first director of the United States geological survey. The most important of his publications are the following. *Mountaineering in the Sierras*, *On the Discovery of Actual Glaciers on the Mountains of the Pacific Slope*, *Systematic Geology*, and *The Age of the Earth*. He died in 1901.

KING, Rufus, American political leader, born in 1755, at Scarborough, Maine. In 1783 he took his seat in the general court of Massachusetts. He became a member of the Continental congress in December, 1784, being re-elected in 1785 and 1786. He took a prominent part in the proceedings of the convention of 1787 which framed the federal constitution, and in the Massa-

chusetts convention called to decide upon the adoption or rejection of that instrument he was instrumental in securing ratification. In 1786 he removed to New York City, where he was elected to the state assembly in 1789 and in the same year was elected to the United States senate, where he at once



took a high place as a leader of the federalists. King was re-elected in 1795 and in 1796 he accepted from President Washington the responsible post of Minister to England. He distinguished himself highly in the diplomatic service, in which he continued until 1803. As the federal candidate for vice-president he received fourteen votes. Again in 1808 he was the federalist candidate for the same office, receiving 47 votes. In 1813 and in 1819 he was elected to the United States senate. In 1825-26 he was again minister to England. He died in 1827.

KING, William Rufus, American statesman, was born in Sampson co., N. C., in 1786. In 1806 he was elected to the state legislature, serving until his election, as a democrat, to the United States congress in 1810. In 1818, he settled as a cotton planter in Dallas co., Ala., was a member of the convention which drew up the constitution for the proposed state in that year, and after its admission in 1819 took his seat in the United States senate as one of the first senators from Alabama. He remained in the senate by re-election until 1844, serving after 1838 as president pro tempore. In 1844 he accepted from President Tyler an appointment as minister to France. In 1846 he was returned to the senate to fill an unexpired term, was re-elected for a full term, and served until 1853, presiding over the body in the last three years as president pro tempore. In 1852 King, who had been a candidate for the democratic nomination for the vice-presidency ever since 1840, was finally named for that office on the Pierce ticket, and was elected. Before the inauguration, however, his health began to fail rapidly, and he went to Havana, Cuba, where by special act of congress he was allowed to take the

oath of office on March 4, 1853. He never entered upon the duties of his office, however, but died shortly after his return to Alabama in the April following.

KING-CRAB, a peculiar genus of crabs included in the order Xiphosura (sword-tailed), of the class Crustacea. They are found on the coasts of northern and tropical America and the Antilles, in the eastern Archipelago and Japan. The head resembles a broad horse-shoe shaped shield, with two pairs of eyes upon the upper surface, the second pair being the larger and forming the true



King-crab.

visual organs. The mouth opens on the lower surface, and around it are six pairs of limbs with spinous joints attached. A second shield somewhat hexagonal in shape covers the abdominal part, and beneath it are the gills, or branchiæ, borne upon five pairs of appendages which represent the abdominal feet of the crab. The average length is about 2 feet. These crabs are destitute of swimming powers, and if placed on their backs they appear, like turtles, unable to recover their natural position. The commonest species is the *Limulus polyphemus*, found chiefly on the North American coasts. The upper surface of the tail, as in other species, bears numerous spines. The *Limulus moluccanus*, of the Moluccas, possesses a strongly serrated tail. This latter species is largely eaten.

KINGFISHER, the name of a family of insectivorous birds distinguished by the elongated stoutly formed, tetragonal bill, broad at the base, and terminating in a finely acute point; tarsi short, feet strong, toes somewhat elongated. The common kingfisher has the upper part



The European kingfisher.

of the head, the sides of the neck, and the coverts of the wings green, spotted with blue. The back is dark green in color, the lower back and rump being of a bright blue. The throat is white,

and the under surface of the body a pale-brown color. It frequents the banks of rivers, and, perched on the bough of a tree, watches for fish. When the prey is perceived it dives into the water, secures the fish with its feet, and carries it to land, where it kills the prey and swallows it entire. It is about 7 inches in length. This bird has been greatly celebrated in ancient poetic and legendary lore, and is the subject of many superstitions. The American kingfisher is of a bluish-slate color, with an iron-colored band on the breast, while the head bears a crest of feathers. The spotted kingfisher is a native of the Himalayas, where it is called the fish-tiger. A large Australian species is known as the laughing-jackass (which see).

KINGLAKE, Alexander William, an English historian, born 1811, and educated at Eton and Cambridge. The first volume of his *Invasion of the Crimea* appeared in 1863, and at once established his reputation as a brilliant historian; seven volumes followed at intervals, the eighth and completing volume in 1887, and they form together a magnificent record of this war. He died in 1891.

KING OF (or at) ARMS, in England, an officer whose business is to direct the heralds, preside at their chapters, and have the jurisdiction of arms. There are three kings of arms in England—Garter, Clarenceux, Norroy, and an officer styled Bath King of Arms, attached to the order of the Bath. There are also Lion King at Arms for Scotland, and Ulster King of Arms for Ireland.

KINGS, Books of, form two books in the English and one book in the Hebrew canon of the Old Testament. Besides their own unity the books of Kings are closely connected with first and second of Samuel, and, following these, form the third and fourth in what is known as the four books of the kingdom. From internal evidence it would seem that these were written by a series of contemporaries, with additions and glosses made by a later writer. The history, as related in the books of Kings, begins with the close of David's reign, and carries the events onward to the capture of Jerusalem and the destruction of the temple. This embraces, according to the received chronology, a period of upward of 400 years (B.C. 1015–588), and includes the history of both the kingdoms of Judah and Israel. This chronology, however, is unsatisfactory, and has been much disputed. In comparing these books with the Chronicles it is found that while the former describes the divided kingdom of Israel and Judah, the latter is occupied almost exclusively with Judah; and further, that the books of Kings seem to have been compiled under prophetic, and the Chronicles under priestly influence.

KING'S COUNTY, an inland county, Ireland, province of Leinster; area, 493,985 acres, of which 351,495 are arable. Pop. 60,129.

KINGSLEY, Rev. Charles, English clergyman, novelist and poet, born in 1819, died 1875. In 1853 was published *Hypatia*, and in 1855 *Westward Ho*, both brilliant historical novels, the former dealing with the early Christian

church, the later with the South American adventurers of the Elizabethan era. Among his other well-known works are *Two Years Ago*, *Hereward the Last of the English*, *Glaucus*, and *The Water Babies*.

KINGSTON, a city of Ontario, Canada. The trade is very considerable, and the harbor is accessible to ships of large size. Kingston was founded in 1783, on the ground formerly occupied by Fort Frontenac. It was incorporated in 1838. The government penitentiary is situated here. Pop. 19,043.

KINGSTON, the capital of the island of Jamaica, on the south coast, with straight and regular streets and houses generally of brick. The principal buildings are the old parish church, town-hall, Jamaica Institute, hospital, court-house,



theater, penitentiary, barracks, and jail. The harbor, which is 6 miles long by 2 miles wide, is separated from the sea by a narrow slip of low land, and forms an excellent anchorage for vessels of any size. It is defended by several forts. Pop. 48,504. See the map.

KINGSTON, a city in New York state, 90 miles north of New York, on the Hudson, by which and by railroad and canal it carries on a large trade. It has carriage factories, iron-foundries and machine shops, cement manufactory, etc. Pop. 27,175.

KING-VULTURE, the *Sarcophagus* Papa of the intertropical regions of America. It is about 2½ feet in length, and upwards of 5 feet across the expanded wings. The other vultures are said to stand quietly by until this, their monarch, has finished his repast.

KING-WOOD, a Brazilian wood from a leguminous tree. It is beautifully streaked with violet tints or West Indian ebony, and is used in turning and small cabinet-work. Called also Violet-wood.



Kinkajou.

KINK'AJOU, a plantigrade carnivorous mammal of northern South America,

allied to the bear family. In habits it is omnivorous, nocturnal, and docile when captured. In shape it resembles the lemur, the legs are short, fur close and woolly, tail long and prehensile. Being fond of honey they make frequent forays upon the nests of bees.

KIOSK, a Turkish word signifying a kind of open pavilion or summer-house, supported by pillars. It has been introduced from the east into the gardens, parks, etc., of Western Europe.

KIO'TO, a large city of Japan, in the island of Hondo, formerly the residence of the Mikado, and the ecclesiastical capital of Japan. It is the center of learning and of artistic manufactures. Pop. 317,270.

KIPLING, Rudyard, English writer, born in Bombay, 1865; After an education in England he returned to India, became connected with the press, and soon became known by short stories contributed to Indian periodicals. In 1890 some of these were brought prominently before the British public, and his reputation was at once secured. Indian and Anglo-Indian life, and especially the life of the European soldier in India, are depicted by him with much graphic power and originality. Among his writings are *Soldiers Three*, *Plain Tales from the Hills*, *The Light that Failed*, *Many Inventions*, *The Jungle Book*, *Second Jungle Book*, *Kim*, *The Days' Work*, *Stalky & Co.*, etc. He has written a good deal of verse, including *Departmental Ditties*, and *Barrack-room Ballads*.

KIRCHHOFF (kir'hof), Robert, German physicist, born 1824, died 1887. He devoted his attention to the subjects of heat, elasticity, and magnetism. Conjointly with Bunsen he discovered the spectroscopic.

KIRGHIZ, Kirghis (kir'gēz), a nomadic Mongol-Tartar race, numbering in its various branches about 3,000,000, and inhabiting the steppes that extend from the lower Volga and the Caspian Sea in the west to the Altai and Thian-Shan Mountains in the east, and from the Sea of Aral and the Syr Daria in the south to the Tobol and Irtysh on the north.

KIRIN, a division or province and town of the Chinese territory Manchuria. The town, also called Kirinoola or Girin, has a pop. of 120,000.

KIRKCALDY (kir-ká'di), known as the "Lang Toun," a royal and parliamentary burgh and seaport, Scotland, county of Fife, on the north shore of the Firth of Forth. Pop. of royal burgh, 34,063; parl. burgh, 22,346.

KIRKCUDBRIGHT (kir-kō'bri), Stewartry of, a maritime county, in the south of Scotland; bounded north by county Ayr, west by Wigtown, north and east by Dumfries, and south by the Solway Firth and Wigtown Bay; area, 582,982 acres. Pop. 39,407.—The county town is a royal burgh. Pop. 2386.

KISH'INEV, or **KISHENAU**, a town of Russia, capital of the government of Bessarabia, on the Byk, a tributary of the Dniester. Pop. about 130,000.

KISSINGEN (kis'ing-en), a watering-place of Bavaria, on the Saale, 30 miles north of Würzburg. The springs, which are cold, and all saline, contain a large quantity of carbonic acid gas, and

are used both internally and as baths.

KITCHENER, Sir Horatio Herbert, Viscount Kitchener or Khartum, British general, born 1850; educated at the Royal Military Academy, Woolwich; entered the Royal Engineers 1871; engaged in survey of Palestine 1874-78; surveyed Cyprus 1880-82; commanded the Egyptian cavalry in 1882-84, and served in the Soudan campaign of 1883-85; was adjutant-general and second in command of the Egyptian army 1888-92; and in 1892 succeeded Sir Francis Grenfell as Sirdar. As such he recovered Dongola (1896), and by the victories of the Atbara and Omdurman (1898) regained for Egypt the lost southern provinces. For these services he was created a baron, and in 1899 he became governor-general of the Egyptian Soudan. In January, 1900, he arrived in South Africa as chief of the staff to Lord Roberts in the Boer war, and in December he became commander-in-chief there. He ended the war by the treaty of Vereeniging on May 31, 1902, and for his services he was created a viscount, and presented with \$250,000 by a vote of the House of Commons.

KITCHEN-MIDDENS, the name given to certain mounds, from 3 to 10 feet in height and 100 to 1000 feet in length, found in Denmark, the north of Scotland, etc., consisting chiefly of the shells of oysters, cockles, and other edible shell-fish. They are the refuse heaps of a pre-historic people unacquainted with the use of metals, all the implements found in them being of stone, bone, horn, or wood. Fragments of rude pottery occur. The bones are all those of wild animals, with the exception of those of the dog. Similar shell deposits occur on the eastern shores of the United States, formed by the Red Indians.

KITE, a raptorial bird of the falcon family, differing from the true falcons in having a somewhat long forked tail, long wings, short legs, and weak bill and talons. This last peculiarity renders it



Kite.

the least formidable of the birds of prey. The common kite, glead, or glade preys chiefly on the smaller quadrupeds, birds, young chickens, etc. It usually builds in the fork of a tree in a thick wood.

KITE, a light framework covered with paper or other light material and held by a string in such a way that the wind

raises it to a greater or less height above the ground. Kites have been used for centuries by the Japanese and Chinese as a toy made in the form of birds, bats, dragons, and other creatures, the framework being covered with silk or paper having ornamental designs. Kites have recently come into quite extended use in meteorological observations and for other useful purposes, also to hold suspended in mid air banners for advertising purposes and for taking photographs.

KITTIWAKE, a species of gull found in great abundance in all the northern parts of the world wherever the coast is high and rocky.

KLEPTOMANIA, a supposed species of insanity manifesting itself in a desire to pilfer. In admitting the plea of kleptomania great caution is needed. The best way to arrive at a judgment is to consider the previous character and personal interests of the person charged; to determine the value and usefulness of the article appropriated; the methods of the appropriation and its probable motive.

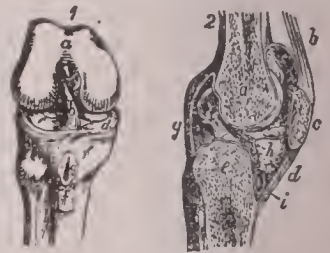
KLONDIKE, a tributary of the Yukon river. The Klondike placer mines are located in the beds and along the banks of the Bonanza, El Dorado, and other tributary streams and creeks of the Klondike river. This district is in the northwest territories of British America just east of the Alaskan border-line, 2200 miles from the mouth of the Yukon river. Gold was discovered in this district by George Carmack, a native of Illinois, in August, 1886. The gold lies all the way through a frozen bed of muck, fine and coarse gravel from 23 to 26 feet deep. The gold is free in large grains and nuggets. The precious deposit is extremely rich, and miners have panned out over \$300 worth of gold per pan. The world at large learned of the rich Klondike mines in July, 1897, and before the middle of August 6,000 men were on their way to the Klondike district, and by the summer of 1898 there were over 40,000 people in the Klondike region. The richest deposits are found on the Bonanza, El Dorado, Gold Bottom, Adams, Bear, Hunker, and Too Much Gold creeks. Dawson City, N. W. T., at the junction of the Klondike and Yukon rivers, is the chief trading post of that district. The total production of the Klondike region is over one hundred and thirty-five millions. Mining operations are seriously embarrassed by the short summer period; three months is the limit of outdoor work. Miners excavate pay-dirt during the winter months and wash the dirt during summer. The discovery of gold at Cape Nome drew many miners from the Klondike in 1899 and 1900. A large number of the small streams that drain the southern side of the peninsula have been worked, including Anvil, Cripple, Eldorado, Ophir, Solomon and Kugruk creeks, each of which gives its name to a local district. The coastal plain in the vicinity of Nome is covered with a heavy growth of moss, and beneath this there are layers of gravel from 40 to 80 feet thick which carry gold. The methods employed in mining these deposits are similar to those used in working the creek gravels.

Most of the excavation is done with the aid of steam for thawing the frozen gravels. The production of the Nome district from its discovery is over \$40,000,000.

KLOPSTOCK, Friedrich Gottlieb, a celebrated German poet, born in 1724, died in 1803; famous as the author of the scared epic, *The Messiah*. He also wrote a number of odes, etc. His reputation was greater in his own day than has since been the case, but he is admitted to have done great service to German literature in assisting to free it from foreign, especially French influence.

KNAPSACK, a bag of leather or strong cloth for carrying a soldier's necessities, and closely strapped to the back between the shoulders.

KNEE, or **KNEE-JOINT**, that joint in the lower limbs of man which corresponds to the elbow in the upper, and is formed by the articulation of the femur or thigh-bone with the tibia, or large bone of the leg. The lower end of the femur terminates in two oblong rounded masses, called the condyles of the femur, which rest in two cavities in the upper part of the tibia; interposed between the



Human knee-joint.

1, Right knee-joint laid open from the front, to show the internal ligaments. *a*, Cartilaginous surface of lower extremity of the femur, with its two condyles. *b*, Anterior cruciate ligament. *c*, Posterior do. *d*, Internal semilunar fibro-cartilage. *e*, External fibro-cartilage. *f*, Part of the ligament of the patella turned down. *g*, Bursa or sac containing synovial fluid laid open.

2, Longitudinal section of the left knee-joint. *a*, Cancellous structure of lower part of femur. *b*, Tendon of extensor muscles of leg. *c*, Patella. *d*, Ligament of the patella. *e*, Cancellous structure of head of tibia. *f*, Anterior cruciate ligament. *g*, Posterior ligament. *h*, Mass of fat projecting into the cavity of the joint below the patella. *i*, Bursa.

two bones are the semilunar cartilages, which diminish the pressure of the femur on the tibia, and prevent the displacement of the former. In front of the knee-joint is the patella or knee-pan. The joint is capable of flexion and extension, and of a very slight rotary movement. The accompanying figures and explanations will enable the joint and its chief features to be thoroughly understood. See also Leg.

KNEIPP (knip), Sebastian, a German priest, the inventor of a special kind of "water-cure," was born in 1821 in Stefansried, Bavaria, Germany. A trifling accident led to systematic experiments in his water-cure treatment, of which one feature is that patients are compelled to walk barefooted in the snow in winter and on the wet grass in summer. Sunshine, fresh air, water, and a definite object at stated hours, are the chief factors in the Kneipp treatment. Societies bearing his name exist in different parts of the world. He died in 1897.

KNIGHT, in feudal times, a man admitted to a certain military rank, with special ceremonies. See Chivalry. In British usage one who holds from the sovereign a certain dignity entitling him to have the title Sir prefixed to his christian name, but not hereditary like a baronetcy called a knight bachelor if not a member of any order. Wives of knights have the legal designation Dame for which Lady is usually substituted. See Knighthood, orders of.

KNIGHT, Charles, English editor and publisher, born 1791, died 1873. He did a great deal of valuable work, superintending and publishing the Library of Entertaining Knowledge; the Penny Magazine and the Penny Cyclopædia, afterward remodelled as the English Cyclopædia, etc. Other publications of his were the Pictorial Bible, the Pictorial Prayer-book, the Thousand and One Nights, Shakespeare, and many others. The Shakespeare was edited by Mr. Knight himself, and has, both for its text and notes, taken a high place among the numerous editions of the great dramatist. The most important of his own writings, the Popular History of England, occupied him seven years, 1854-61. An autobiography, Passages of a Working Life During Half a Century, appeared in 1863-65.

KNIGHTHOOD, Orders of, the name given to organized and duly constituted bodies of knights. The orders of knighthood are of two classes—either they are associations or fraternities, possessing property and rights of their own as independent bodies, or they are merely honorary associations established by sovereigns within their respective dominions. To the former class belong the three celebrated religious orders founded during the Crusades—Templars, Hospitallers, and Teutonic Knights. The other class, consisting of orders merely titular, embraces most of the existing European orders, such as the order of the Golden Fleece, the order of the Holy Ghost, the order of St. Michael. The British orders are the Garter, the Thistle, St. Patrick, the Bath, St. Michael and St. George, the Star of India, the Indian Empire, and the Royal Victorian Order. The various orders have each their appropriate insignia, which generally include a badge or jewel, a collar, a ribbon of a certain color, and a star.

KNIGHTS OF LABOR, a labor organization founded at Philadelphia in 1869. Its operations are secret, but its professed object is the amelioration and protection of the laboring classes. This body comprehends the intelligences of the wage workers of the United States. Of late years the membership has largely decreased, through internal dissensions and ill-advised strikes.

KNIGHTS OF ST. JOHN. See John (Knights of St.)

KNIGHTS TEMPLARS. See Templars.

KNITTING, an industrial and ornamental art allied to weaving, but of much later origin. It consists in forming a series of loops with a single thread, through which another row of loops is passed, and so on consecutively; differing from crochet in so far as the series of loops are not thrown off and finished

successively. In hand-knitting steel wires are used to form the loops on. For manufacturing purposes hand-knitting has been entirely superseded by machinery.

KNOT, a complication of a thread, cord or rope, or of two or more threads, cords, or ropes by tying, knitting, or entangling. Knots expressly made as means of fastening differ as to form, size, and name according to their uses, as overhand-knot, reef-knot, half-hitch, close-hitch, timber-hitch, fisherman's-bend, carrick-bend, sheet-bend, single-wall knot, double-wall knot, etc. The term knot is also applied on shipboard to a division of the log-line which is the same fraction of a mile as half a minute is of an hour, that is, it is the hundred and twentieth part of a nautical mile; hence, the number of knots run off the reel in half a minute shows the vessel's speed per hour in miles, so that when a ship goes 8 miles an hour, she is said to go 8 knots. Hence, the word has come to mean also a nautical mile or 6086.7 feet.

KNOUT, a kind of whip or scourge serving as an instrument of punishment in Russia. It was formerly in use in the army, but a few strokes only are now inflicted, as a disgrace, in case of dismissal. It is still sometimes used for criminals. The nobles were exempted from the knout, but the exemption was not always observed.

KNOW NOTHINGS, the popular name for the Native American party, which was formed in 1852. It aimed through naturalization laws to make politically powerless the large number of immigrants then settling in the country. It had entirely disappeared by 1860.

KNOX, John, the chief promoter of the reformation in Scotland, was born at Gifford, in East Lothian, in 1505; died at Edinburgh in 1572. He became an avowed advocate of the reformed faith about 1542. In 1546-47 he preached to the beleaguered protestants in the castle of St. Andrews, and when it was taken by the French Knox was sent to France with the other prisoners, and put to the galleys, from which he was released in 1549. He passed over to England, and, arriving in London, was licensed either by Cranmer or the Protector Somerset, and appointed preacher, first at Berwick, and afterward at Newcastle. In 1551 he was appointed chaplain to Edward VI., and preached before the king at Westminster, who recommended Cranmer to give him the living of Allhallows, in London, which Knox declined, not choosing to conform to the English liturgy. It is said that he also refused a bishopric. On the accession of Mary, in 1554, he quitted England, and sought refuge at Geneva. He ventured, in 1555, to pay a short visit to his native country. He again retired to Geneva, where he wrote the First Blast of the Trumpet against the Monstrous Regiment of Women, chiefly aimed at the cruel government of Queen Mary of England, and at the attempt of the queen regent of Scotland to rule without a parliament. A Second Blast was to have followed; but the accession of Queen Elizabeth to the throne of England, who was expected to be friendly

to the Protestant cause, prevented it. In May, 1559, he returned to Scotland, and immediately joined the Lords of the Congregation. Being appointed minister of Edinburgh, he took a prominent part in the proceedings of the Protestant leaders from this time onward, and had the principal share of the work in drawing up the Confession of Faith, which was accepted in 1560 by the parliament. In 1561 the unfortunate Mary arrived in Scotland. She immediately began the regular celebration of mass in the royal chapel, which, being much frequented, excited the zeal of Knox, who openly declared from the pulpit, "that one mass was more frightful to him than 10,000 armed enemies landed in any part of the realm." He preached with equal openness against the marriage of Mary and Darnley, giving so much offense that he was called before the council and inhibited from preaching. After the death of Murray, in 1569, Knox retired for a time to St. Andrews. In 1572 his constitution was quite broken, and he received an additional shock by the news of the massacre of St. Bartholomew. He had, however, strength enough to preach against it, but soon after took to his bed, and died. He was twice married, first to Marjory Bowes in 1555, and secondly, in 1564, to Margaret Stewart, daughter of Lord Ochiltree.

KNOXVILLE, a town of the United States, capital of Knox co., Tennessee, an important commercial and manufacturing center at the head of steamboat navigation on the Holston river, 165 miles east of Nashville. It contains the East Tennessee university, the Knoxville university, the State agricultural college, and other educational and literary institutions. Pop. 32,637.

KOA'LA, a curious arboreal marsupial of Australia. It is about 2 feet in length, tailless, stoutly built, and clothed with thick, ash-gray, woolly hair. In the fore feet the first and second digits



Koala.

are opposable to the remaining three; in the hind feet the great toe is opposable. The animal is nocturnal in habit, and brings forth a single cub, which is carried for some time in the pouch and afterward on the mother's back.

KOBE, a seaport of Japan, adjoining Hiogo so closely as to form one town with it. It is of more recent origin than Hiogo, and is strictly the port opened by treaty to foreign commerce. Combined pop. 215,780.

KOCH, Robert, a German bacteriologist, and founder of the germ theory of disease. He was born at Clansthal, Hanover, in 1843, and was educated at Göttingen. He began his researches in 1872, and ten years later succeeded in isolating the bacillus of tuberculosis. His chief services in bacteriology are the methods he invented for demonstrating



Dr. Robert Koch.

the presence of germs, particularly his methods of staining bacteria so as to make them visible. In 1890, while Koch was experimenting his lymph-cure for tuberculosis a student prematurely reported it and Koch was placed in a false position as having made claims of which he had no knowledge. The value of the lymph is problematical. In 1885 Koch was made professor at Berlin.

KOCK, Charles-Paul de, French novelist, born 1794, died 1871. He wrote an immense number of novels which had a great popularity, and have yet a certain value as pictures of low and middle-class Parisian life during the first half of the 19th century. Besides his novels, he wrote some dramas, chiefly taken from them.

KOHAT, a town of India, headquarters of district of the same name in the new Northwest Frontier Province. Pop., including suburbs and cantonments, 30,762. The district has an area of 2771 sq. miles, and a pop. of 203,175.

KOH-I-NOOR. See Diamond.



Kohl-rabi.

KOHL-RABI, a cultivated variety of the cabbage, distinguished by a swelling

at the neck of the root, which is eaten, and in its qualities much resembles Swedish turnip. It is valuable as a cattle food.

KO'KOMO, the county-seat of Howard co., Ind., 54 miles north of Indianapolis; on the Wildcat river, and on the Pittsburg, Cincinnati, Chicago and St. Louis, the Toledo, St. Louis and Kansas City, and the Lake Erie and Western railroads. Pop. 12,195.

KOLA, Cola, a genus of plants, a native of Western Tropical Africa. The Kola produces a fruit which consists of two, sometimes more, separate pods containing several seeds about the size of horse-chestnuts. The seeds have been found to contain caffeine, the active principle of coffee, as also the same active principle as cocoa with less fatty matter. A drink prepared from them is largely used and is said to have digestive, refreshing, and invigorating properties. The tree has been introduced into the West Indies and Brazil.

KOLA'BA, a British Indian district in the southern division of the Bombay Presidency; area, 1872 sq. miles; pop. 509,584.

KOLAPOOR'. See Kolhapur.

KOLAR', a district of the native state of Mysore, Southern India; area, 3059 sq. miles; pop. 591,030. The chief town is called Kolar. Pop. 11,172.

KOLHAPUR (kol-hä-por'), a native Indian state, Bombay Presidency; area, 2816 miles; pop. 913,131. Kolhapur is the chief town. Pop. 54,373.

KONIGSBERG (keu'nihs-berg), a fortified seaport town of Prussia, capital of the province of East Prussia. The principal public buildings are the cathedral, a Gothic structure, begun in 1333, restored in 1856, situated on the Kneiphof; the Schloss, or palace, begun in 1255, formerly the residence of the grand-masters of the Teutonic order, and now containing apartments for the royal family, government offices, etc.; the Schlosskirche, or palace church, occupying a wing of the palace; the new university, completed in 1862; the old university; the exchange, a fine modern building; the city museum, theater, etc. The university, founded in 1544 by the Margrave Albert, and has connected with it a library of 220,000 vols., a zoological museum, and other valuable collections. The manufactures of Königsberg are various. The chief trade is in grain, flax and hemp, timber; tea, etc. Pop. 187,897.

KONIGSHÜTTE (keu'nihs-hüt-é), a town of Prussia, province of Silesia, 49 miles e.s.e. of Oppeln. Pop. 57,919.

KONRAD. See Conrad.

KOODOO (native name), the striped antelope, a native of South Africa, the male of which is distinguished by its fine horns, which are nearly 4 feet long, and beautifully twisted in a wide spiral. The koodoo is of a grayish-brown color, with a narrow white stripe along the back, and eight or ten similar stripes proceeding from it down either side. It is about 4 feet in height, and fully 8 in length.

KOORIA MOORIA ISLANDS, a group of five islands on the southeastern coast of Arabia, belonging to Britain. There was a considerable deposit of guano on

the largest island; but it was not of very good quality, and is now exhausted.

KOPEK. See Copeck.

KO'RAN (Al-Korân, that is the Koran, which means originally "the reading, or that which is to be read"), the book containing the religious and moral code of the Mohammedans, and by which, indeed, all their transactions, civil, legal, military, etc., are regulated. According to the Mohammedan belief it was written from the beginning in golden rays on a gigantic tablet in the highest heavens, and portions were communicated by the angel Gabriel to Mohammed at intervals during twenty-three years. These were dictated by Mohammed to a scribe and kept for the use of his followers. After Mohammed's death they were collected into a volume, at the command of Mohammed's father-in-law and successor Abu Bekr. This form of the Koran, however, was considered to contain erroneous readings, and in order to remove these Caliph Othman caused a new copy to be made from the original fragments in the thirtieth year of the Hejra (652 A.D.), and then ordered all the old copies to be



Koodoo, or striped antelope.

destroyed. The leading doctrine of the Koran is the Oneness of God, clearly laid down in the symbol of the Moslem—"God is God, and Mohammed is his prophet." To Christ it assigns a place in the seventh or highest heaven, in the immediate presence of God, but he is simply regarded as one of the prophets—Adam, Noah, Abraham, Moses, Jesus and Mohammed. The doctrines of good and bad angels, and of the resurrection and final judgment, are fully set forth, as is also God's mercy, which secures entrance into heaven and not the merits or good works of a man. The joys of heaven range from music and women to the supreme joy of beholding God's face, while the pains of hell are depicted in vivid colors. Idolatry and the deification of created beings are severely condemned. Another dogma is set forth in the Koran, yet not explicitly, that of the unchangeable decrees of God. Mohammed used the doctrine of predestination with great success to infuse into his adherents undaunted courage, which elevated them above all perils. The Koran prescribes prayer, fasting, alms, and the pilgrimage to Mecca and Mount Arafat.

The great fast is that of Ramadan (which see). He prescribed prayer five times a day with the face turned toward Mecca. Purification must precede prayer and where water is unattainable dry dust or sand may be used. To give alms was always a particular trait of the Arabians, but Mohammed made it obligatory. The pilgrimage or something similar had existed with most sects before him. In respect to the civil laws relating to polygamy, divorce, inheritance, etc., Mohammed followed step for step the laws of Moses and the decisions of the rabbis, only adapting them to the customs and prejudices of his countrymen. The Koran is written in prose, but the different parts of a sentence end in rhymes. In size it is about equal to the New Testament; it is divided into 114 surahs or chapters of unequal length, each of which begins with the phrase, "In the name of God." As the work was written at different times, in different moods, and on different occasions, there is naturally great diversity in the style of different passages. The language is considered the purest Arabic. It is, however, very different from the spoken Arabic of modern times. Commentaries on the Koran are exceedingly numerous.

KORDOFAN', a country of Africa, in the Eastern Soudan between Darfur and the Nile. Pop. estimated at 400,000. The chief town is El Obeid.

KOREA. See Korea.

KORNER (keur'nér), Karl Theodor, German poet, born at Dresden 1791, killed 1813. He owes his fame to his celebrated patriotic lyrics, which are all national in Germany. In 1813, when Germany took up arms against Napoleon, Körner joined the famous Lützow corps of black huzzars, and was fatally wounded in a skirmish fought in the neighborhood of Gadebusch, in Mecklenburg-Schwerin. The collection of songs published soon after his death as *Leyer und Schwert* (Lyre and Sword) contains some of the finest war-songs in any language.

KOSCIUSKO (kos-si-us'ko, or kosh-tsyush'kō), Thaddeus, Polish patriot, was born in Lithuania of an ancient and noble family in 1746, and died at Soleure (Solothurn) 1817. He was educated in the military school at Warsaw, and was afterward sent at the expense of the state in the capacity of sub-lieutenant to complete his studies in France. On his return to Poland he became tutor to the daughter of Gosnovski, marshal of Lithuania, but having conceived a passion for his pupil, and being disappointed in his suit, he quitted his native country and betook himself to America (1777), where he attracted the notice of Washington, was appointed by him engineer, with the rank of colonel, and afterward general of brigade. He did not return to Europe till three years after the conclusion of the peace of 1783. For some years after his return he lived in retirement, but after serving in his own country under Poniatowski, he was appointed in 1794 generalissimo of the insurgent forces. He defeated the Russians at Raclavice, near Cracow, but at the battle of Maciejovice his army was defeated and he himself wounded and

taken prisoner. He remained in captivity for two years, but was liberated on the accession of Paul I. of Russia in 1796. After visiting England and America, he ultimately settled at Soleure in Switzerland, where he continued to live in quiet retirement. In 1817 he issued from here a letter of emancipation to the serfs on his estate in Poland. In 1818 his body was removed at the expense of the Emperor Alexander of Russia to Cracow, where it was buried in the cathedral, and where a monument was erected to him. A mound 150 feet in height, formed of earth from all the principal battle-fields of Poland, was also raised to his memory in the vicinity of Cracow.

KOSSUTH (kosh'shüt), Lajos (Louis), Hungarian patriot, born at Monok in the county of Zemplin, Hungary, 1802. He studied law, and in 1832 entered the Presburg parliament. For persisting in publishing the debates of the diet, he was condemned to four years' imprisonment. In 1841 he became editor of the *Pesth Journal*, and in 1844 he founded a national league in opposition to the Viennese government. In 1847 he was elected to the diet by the national party, and secured the appointment of a responsible Hungarian ministry, in which he became minister of finance. During the Hungarian war for liberty he was chosen governor or dictator, but the intervention of Russia rendered all the efforts of the Hungarians unavailing. Kossuth resigned, was succeeded by Görgey whom he accused of treachery, and was interned in Turkey. He was released through the intervention of Britain and the United States; visited these countries and met with an enthusiastic reception. He was long regarded as the leader of the irreconcilable party, but in 1884 he became reconciled to the Hapsburg rule. His chief residence in his latter years was at Turin, where he died in 1894.

KOSTROMA', an inland government of Russia, area 30,811 sq. miles. Pop. 1,429,228.—Kostroma, the capital is an ancient place, and has a fine old cathedral situated in the Kreml or former citadel. Pop. 41,268.

KOTAH, an Indian native state in Rajputána. Area, 3797 sq. miles, pop. 526,267.—Kotah, the chief town, is situated on the river Chambal, and has a pop. of 33,657.

KOUMISS, or **KUMISS**, a preparation of milk, whether cow's, mare's ass's, goat's, which is said to possess wonderful nutritive and assimilable properties. It consists essentially of milk in which alcoholic fermentation has been developed. On the Asiatic steppes, where it has been long used as a beverage, it is made of mare's milk; but koumiss of mare's milk or goat's milk has a somewhat unpleasant smell.

KOVNO, a town in Russian Poland. The population, a great part of which consists of Jews, is 73,543.—The government has an area of 15,602 sq. miles, and its population is 1,549,444.

KRAAL, a South African native village or town, usually a collection of huts surrounded by a palisade. Sometimes the term is applied to a single hut.

KRAKATO'A, a small uninhabited

volcanic island situated in the Sunda straits, about equally distant from Java and Sumatra. In May of 1883 intimations of volcanic activity were observed, and on August 27th a gigantic explosion took place which actually blew away a large part of Krakotoa, and entirely altered the physical features of the island and the neighboring coasts. An immense wave swept over the shores of the neighboring islands occasioning a loss of life variously estimated at from 15,000 to 50,000. To the north two new islands appeared where the morning previous there had been from 30 to 40 fathoms of water.

KREASOTE. See Creasote.

KREFELD (krä'felt), a town in Rhenish Prussia, in the government of Düsseldorf and 12 miles northwest of the town of Düsseldorf. Pop. 109,119.

KREMENTCHUG, a town in Russia, government of Poltava. Pop. 58,648.

KREMLIN, a fortress, in Russia the citadel of a town or city specifically applied to the ancient citadel of Moscow. See Moscow.

KREUTZER, **KREUZER** (kroit'sér) an old South German copper coin, equal to the sixtieth part of the gulden or florin, or about two-thirds of a cent. The Austrian current coin bearing this name is the hundredth part of a florin, or equivalent to nearly one-half of a cent.

KRISHNA, in Hindu mythology, the eighth avatar of Vishnu and the most popular deity in the Hindu pantheon. He was ostensibly the son of Vasudeva and Devaki of the royal family of the Bhoja reigning at Mathura. The reigning prince at the time of his birth was Kansa, who, to prevent the fulfilment of a prophecy, sought to destroy the young child, but his parents, assisted by divine



Krishna.

power, succeeded in baffling all his efforts. Every year of his life furnishes the subject of some legend, his story showing a remarkable resemblance to those of the Greek Heracles and Apollo. After a series of amorous and heroic exploits, detailed at length in the Puranas, he slew Kansa, mounted the throne, and was at last killed by the arrow of a hunter, shooting unawares in a thicket.

KROPOT'KINE, Prince Peter Alexeievitch, Russian anarchist, born at

Moscow, 1842. He entered the corps of pages and then the army, traveled extensively in Siberia and Manchuria, studied some years at St. Petersburg, and wrote several esteemed books. In 1872 he joined the International Society, and began pushing his revolutionary ideas in Russia. He was arrested and imprisoned, but made his escape and took up residence in Switzerland. Expelled from Switzerland he took refuge in France, and was, in 1883, condemned to five years' imprisonment for complicity in outrages at Lyons, but was pardoned in 1886, when he went to England. He is an eloquent speaker and writer, and has made valuable contributions to several branches of knowledge.

KRUGER (krö'gër), Stephen John Paul, president of the South African Republic (Transvaal), was born in Cape Colony in 1825, migrated in the "great trek" of the Boers in 1837, and latterly settled in the Transvaal, where he soon became prominent in military and civil affairs. He was president from 1883 till the annexation in 1900, and died in Holland in 1904.

KRUPP (krup), Alfred, German engineer and iron manufacturer, born at Essen 1812, died 1887. He succeeded his father as proprietor of a small metal foundry at Essen, which he gradually developed to an enormous extent. He discovered a new method of casting steel in large masses, which he exhibited in 1851. This led him to the manufacture of heavy steel ordnance, and especially to the construction of heavy



Alfred Krupp.

breech-loading guns of a type invented by himself, the first of these being produced in 1864, but great improvements being subsequently effected, and the size being immensely increased. Though his name is popularly associated with the manufacture of these large guns the extensive works at Essen turn out also immense quantities of gun-carriages, shot, boiler-plates, axles, wheels, rails, screw-shafts for steamers, etc.

KUBAN, a Russian territory in the Caucasus. Area, 36,251 sq. miles; pop. 1,922,773.

KUBLAI (kō'blā) **KHAN** (more properly Khūbilai Khan), Mongol emperor founder of the 20th Chinese dynasty,

that of the Mongols or Yuen; born 1214, died 1294. In 1259 he succeeded his brother as Grand Khan of the Mongols, and in 1260 he conquered the whole of Northern China, driving out the Tartar or Kin dynasty. He then ruled over the conquered territory himself, and nineteen years later added to it Southern China, driving out the Tartars from the north. Kūblia thus became sole ruler of an empire extending over a large part of Asia, as well as over those parts of Europe that had belonged to the dominions of Genghis Khan. Marco Polo, who lived at the court of this prince, describes the splendor of his court and entertainments, his palaces and hunting expeditions, his revenues, his extraordinary paper currency, his elaborate system of posts, etc. Kūblai Khan is the subject of a poetical fragment by Coleridge.

KUKU, or **KUKAWA**, a town in Western Africa. Pop. (estimate), 60,000.

KU-KLUX-KLAN, a secret society of a socio-political nature, bitterly opposed to the reconstruction measures which the government of the United States passed with reference to the rebel states of the south which had been subdued in the war of 1861-64. They numbered at one time about 550,000 members, spread over nearly all the states of the south, but especially South Carolina, Georgia, Alabama, Mississippi, Kentucky, and Tennessee. The members did not hesitate to commit any act of violence, even murder and arson. Strong measures were taken for the suppression of the society in 1871, and it soon after died away.

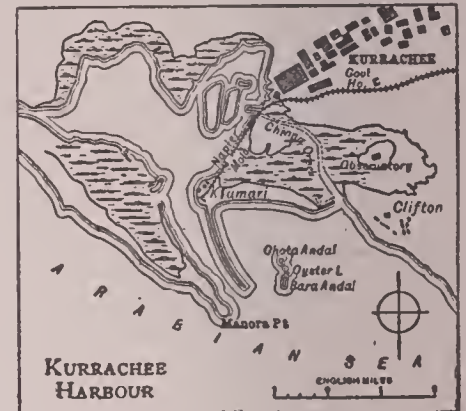
KUMA'ON, or **KUMA'UN**, a British district of Northern India, in the United Provinces, belonging to the Himalayas. Area, 7151 sq. miles; pop. 563,181. It forms with the districts of Garhwal and Tarai the division or commissionership of Kumaon, which has an area of 13,743 sq. miles, and a pop. of 1,181,567.

KURDISTAN (kür-di-stān'; "Land of the Kurds"), an extensive territory of Western Asia. As it does not form a separate political division, its exact limits are not ascertained. The Kurds, to whom the territory owes its name, are not confined within its limits, but are found in considerable numbers eastward in Khorasan and over the hilly region of Mesopotamia, as far west as Aleppo and the Taurus. They are a stout, dark race, well formed, with dark hair, small eyes, wide mouth, and a fierce look. On their own mountains they live as shepherds, cultivators of the soil, and bandits. Their language is a dialect of Persian, now much mixed with Arabic and Syriac; their religion Sunnite Mohammedanism. The Kurds owe but slight allegiance to either Turkey or Persia, living in tribes under their own chiefs, who commonly exact duties on the merchandise which passes over their territory. Their numbers have been estimated at 1,800,000.

KURO SIVO, or **JAPAN CURRENT**, the gulf-stream of the Pacific, is the offspring of the great equatorial current, flows past Formosa, Japan, the Kuriles,

the Aleutian Islands, and thence bends southward to California. It is much inferior to the gulf-stream both in volume and high temperature.

KURRACHEE (ka-rā'shē), or Karachi an important seaport of India, on the coast of Sind, Bombay presidency, at the northern (or western) angle of the Indus delta, situated on a large, and commodious creek or inlet, forming a good haven, perfectly safe in all winds, and out of the track of cyclones. The harbor is formed by a long narrow strip



of sand on the west, ending with a rocky promontory called Manora Head, on which is a lighthouse; and by the Island of Kiamari on the east. The town was taken possession of by the British in 1842, and its extensive commerce, fine harbor works, and numerous flourishing institutions have all sprung up since that time. Pop. 115,407.

KURSK (kürsk), a government of southern Russia, area 18,901 sq. miles. Pop. 52,896.

KUSTENLAND (küs'ten-lánt), an administrative division of the Austrian Empire; area, 3084 sq. miles. The majority of the inhabitants are of Slavonic origin, but there is also a large proportion of Italians and a considerable number of Germans. Pop. 755,183.

KUTAI (kü-tā'is), a Russian town. Pop. 32,492.—The government has an area of 8039 sq. miles, and pop. of 1,075,861.

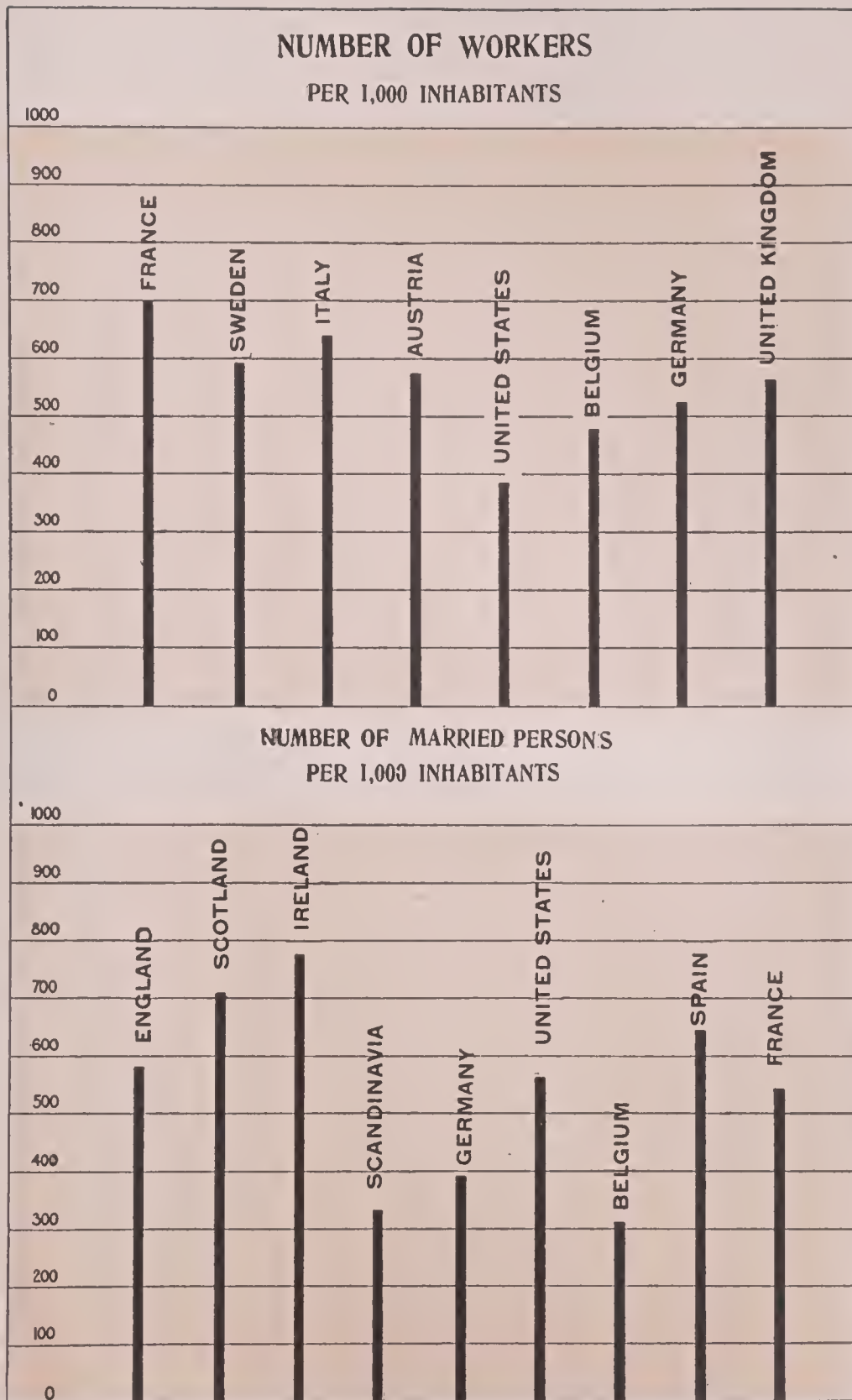
KUTAYYA, a town in Asiatic Turkey, 180 miles northeast of Smyrna, on the route between Constantinople and Konia. Estimated pop. 60,000.

KWANGSI, a province of China. Rice is largely grown, and gold, silver, and mercury are mined. Area, 78,250 sq. miles; pop. 5,151,327.

KWANGTUNG, the most southerly province of China. The capital is Canton; other ports are Swatow and Pakhoi. Area, 79,456 sq. miles; pop. 29,706,249.

KWEICHOW, a province of s.w. China. It produces rice, tobacco and timber, and has mines of copper, iron, lead, and mercury. Area, 64,554 sq. miles; pop. 7,669,181.

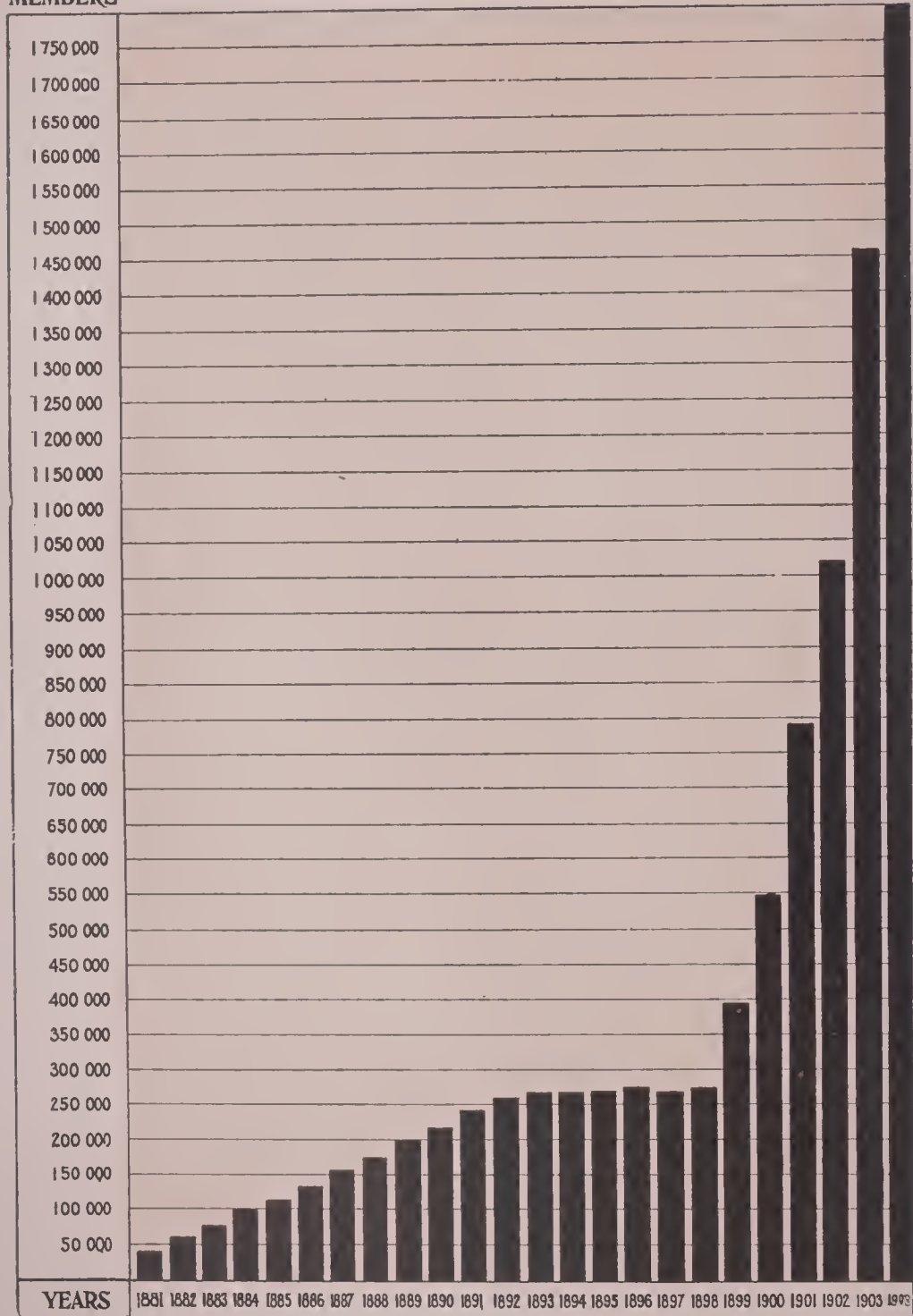
KYRIE ELEISON (kī'ri-ē ē-lī'son; from the Greek Kyrie eleēson, "Lord, have mercy"), a kind of invocation used in parts of the Roman Catholic Church service. It is almost the only part of the liturgy in which the Latin Church has retained the use of Greek words.



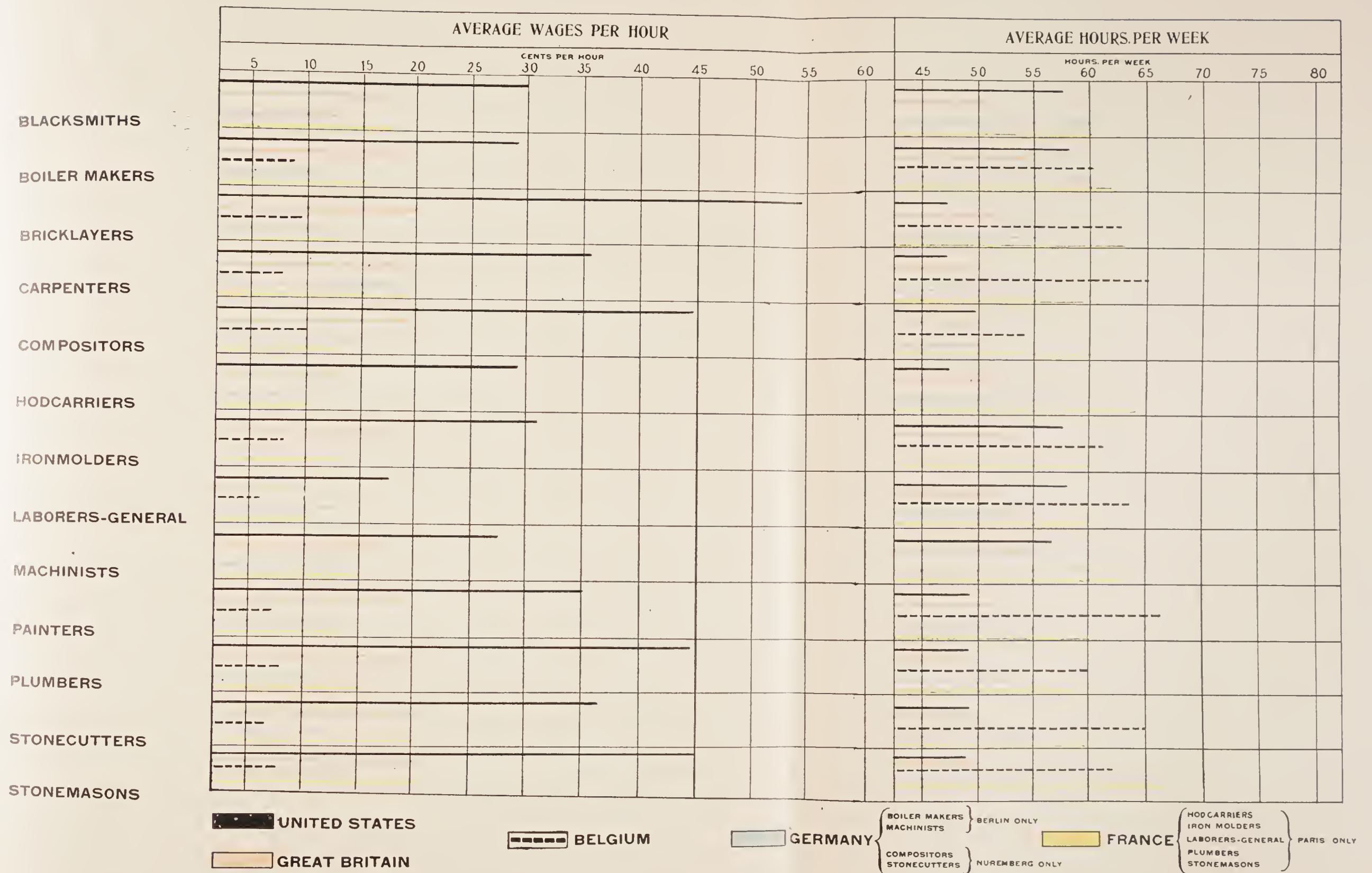
MEMBERSHIP, AMERICAN FEDERATION OF LABOR

1881 TO 1908

MEMBERS



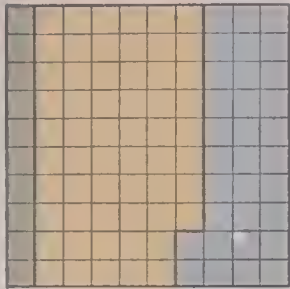
WAGES AND HOURS OF LABOR UNITED STATES AND EUROPE



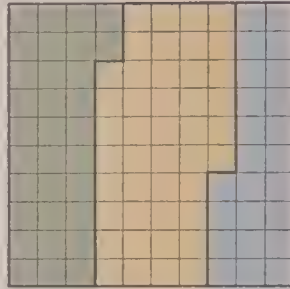
OCCUPATIONS

PERCENTAGE IN EACH CLASS

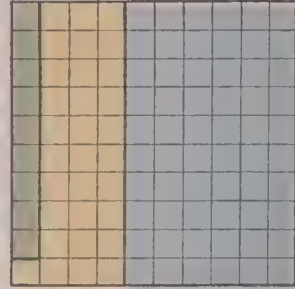
GREAT BRITAIN



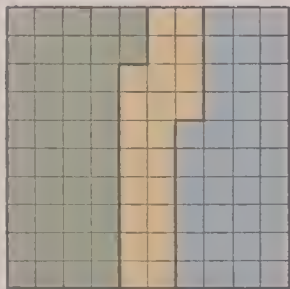
IRELAND



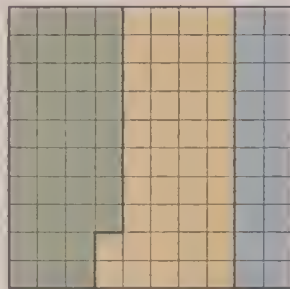
BELGIUM



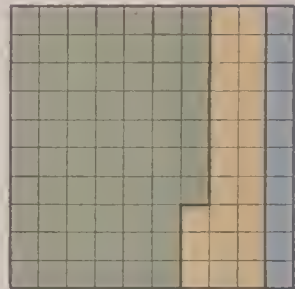
FRANCE



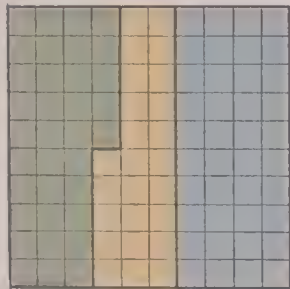
GERMANY



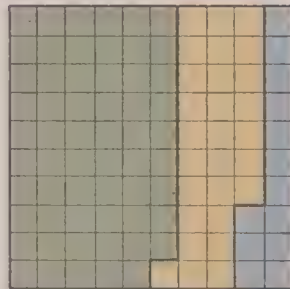
AUSTRIA



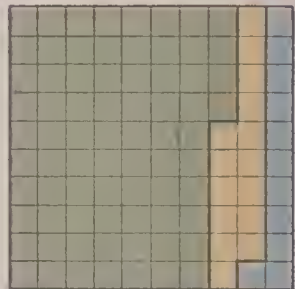
UNITED STATES



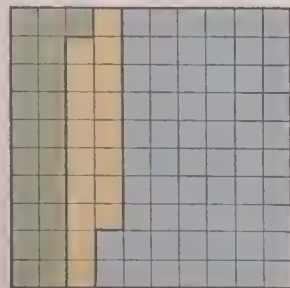
ITALY



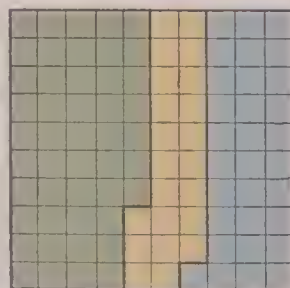
RUSSIA



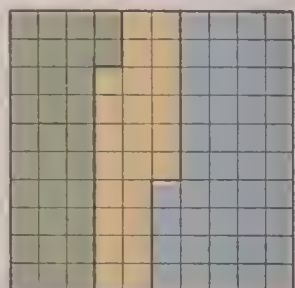
HOLLAND



CANADA



AUSTRALIA



AGRICULTURE

MANUFACTURES

COMMERCE, ETC.

L

L, the twelfth letter of the English alphabet, is usually denominated a semi-vowel or a liquid. **L** has only one sound in English. The nearest ally of **l** is **r**, the pronunciation of which differs from that of **l** only in being accompanied by a vibration of the tip of the tongue. There is no letter, accordingly, with which **l** is more frequently interchanged, instances of the change of **l** into **r** and of **r** into **l** being both very common in various languages. In fact in the history of the Indo-European alphabet **l** is considered to be a later modification of **r**.

LA, in music, the sixth of the seven syllables—*ut* or *do*, *re*, *mi*, *fa*, *sol*, *la*, *si*—representing the seven sounds in the diatonic scale.

LAAGER (lā'gēr), in South Africa, an encampment more or less fortified. The original Boer laager is an inclosure made of the wagons of a traveling party for defense against enemies.

LAALAND (lō'lān), or **LOLLAND**, an island in Denmark. Pop. 70,596.

LA'BIALS, letters or characters representing a sound or articulation formed or uttered chiefly by the lips, as **b**, **f**, **m**, **p**, **v**.

LABIA'TÆ, the mint tribe, a very important and extensive natural order of exogenous plants, with a gamopetalous corolla presenting a prominent upper and lower lip, and a four-lobed ovary, changing to four seed-like monospermous fruits. This order contains about 2600 species, mostly herbs, under-shrubs or shrubs with opposite or whorled leaves, usually square stems, and a thyrsoïd or whorled inflorescence. They are spread throughout the world, and abound in all temperate latitudes. Many are valued for their fragrance, as lavender and thyme; others for their stimulating qualities, as mint and peppermint; others as aromatics, as savory, basil, and marjoram; several are used as febrifuges. Betony, ground ivy, horehound, and others possess bitter tonic qualities.

LAB'ORATORY, a building or workshop designed for investigation and experiment in chemistry, physics, etc. It may be for special research and analyses, or for quite general work. To the former class belong the laboratories which are attached to dyeworks, color works, chemical, and similar works. Laboratories are also attached to mining and metallurgical schools, to mints, to arsenals, etc. A general laboratory, such as might be attached to a school or university, has to include a variety of specialties, partly because the whole science and its applications have to be taken into account and exhibited, partly because students with very different aims frequent such places.

LABOUCHERE (lab'ū-shār), Henry, English politician and writer, was born 1831. He was in the diplomatic service from 1854 to 1864; became member of parliament in the radical interest for Windsor (1865-66), Middlesex (1867-68), and Northampton since 1880. He contributed Letters of a Besieged President in Paris to the Daily News—of which he was part proprietor—during

the Franco-German war. In 1877 he started Truth, a weekly society paper.

LABOULAYE (lā-bō-lā), Edouard René Lefebvre, French publicist, born 1811, died 1883. He attained a high position as a writer of historical, social, and playfully satirical works. Among his best-known writings are History of Landed Property in Europe; History of the United States; Germany, and the Slavic States; Paris in America; The New Bluebeard; The Poodle Prince; Prince Caniche, etc., etc.

LABOR. See Birth.

LABOR, American Federation of, a confederation of trades unions for the improvement in the conditions and wages of labor; the establishment of self-governing unions in every trade; the formation of public opinion by platform, press, and legislation and the furtherance of a civilization based upon industrial progress by securing a reduction in the hours of labor. Among the affiliated unions are the Brotherhood of Carpenters and Joiners, the International Typographical Union of North America, the Cigar Makers' International Union, and the Granite Cutters' National Union of the United States of America. The largest affiliated union is the United Mine Workers of America. The American Federation of Labor is growing very rapidly, and has a membership of nearly 1,500,000. It has practically taken the place of its old rival, the Knights of Labor.

LABOR AND COMMERCE, Department of, one of the nine executive departments of the federal government created by act of congress February 11, 1903. It is presided over by a secretary, who is also a member of the cabinet. The act of congress creating the new department charges it with the duty of fostering, promoting, and developing the foreign and domestic commerce of the United States, mining, manufacturing, and fishery industries, the interests of labor, improvement of transportation facilities, and the supervision of the business of insurance. The organization of the department consists of a bureau of corporations, a bureau of manufactures, the bureau of labor, the lighthouse board, the lighthouse establishment, the steamboat-inspection service, the bureau of navigation, the bureau of standards, the coast and Geodetic survey, the immigration service, including the enforcement of the Chinese exclusion acts, the bureau of statistics of the treasury department, the shipping commissioner, the bureau of foreign commerce (formerly in the department of state), the census bureau, and the fish commission, including control of the fur-seal, salmon, and other fisheries of Alaska. An entirely new feature is the bureau of corporations which is given partial jurisdiction of the control of trusts and trade combinations.

LABOR, Bureau of, the United States Department of Labor was organized in 1885 as one of the bureaus of the department of the interior. After it had been in existence three years it was changed to the department of labor with

independent functions. Since 1895 a bi-monthly bulletin has been published. Thirty-one states have bureaus of labor, several of them conducting free employment agencies and the inspection of factories and mines is an important function of many of them.

LABOR DAY, a day set apart as a legal holiday in nearly all of the states and territories of the United States. In 1884, on the resolution of George R. Lloyd, one of the Knights of Labor, it was decided that all future parades should be held on the first day of September, and that the day should be known as Labor Day. Workingmen's organizations all over the country then began an agitation to induce the state legislatures to declare the day a legal holiday, and on March 15, 1887, Colorado led the way, to be quickly followed by New Jersey, New York, and Massachusetts. The great majority of the states have selected the first Monday in September as Labor Day. In 1903 the only states in which Labor Day was not a legal holiday were Mississippi, Nevada, North Dakota and Louisiana.

LAB'RADOR, a tract of land on the east coast of British North America, between Canada and the Atlantic, under the government of Newfoundland. The interior consists mostly of a table-land 2000 or more feet high. There are a number of lakes drained partly by rivers flowing toward Hudson's Strait, partly by others (such as Grand river), reaching the Atlantic in the southeast. The wild animals include the caribou or reindeer, bears, wolves, foxes, martens, and other fur-bearing animals. The climate is rigorous, there being about nine months of winter. No ordinary cereal can ripen in the climate, though barley cut green is used as fodder, and potatoes and some culinary vegetables can be grown. The population (about 8000 in all) consists of Indians, Eskimos, and half-breeds, with a few whites on the coast. In summer it is increased by some 30,000 persons, chiefly from Newfoundland and connected with the fisheries. The Moravians have a number of missions along the coast, the Church of England one or two. The Hudson's Bay company has several posts. Labrador is also the name given to the whole peninsula between the Atlantic, Hudson Strait and Hudson Bay and the St. Lawrence. See Canada, Northeast Territory, Quebec.

LAB'YRINTH, a structure having numerous intricate winding passages, which render it difficult to find the way through it. The legendary labyrinth of Crete, out of which no one could find his way, but became the prey of the Minotaur, was said to have been constructed by Dædalus. The hint of this legend was probably given by the fact that the rocks of Crete are full of winding caves. The Egyptian labyrinth was a building situated in Central Egypt, above Lake Mæris, not far from Crocodilopolis (Arsinoë), in the district now called the Fayoum. The building, half above and half below the ground, contained 3000 rooms. It was probably a place of burial.

The labyrinth at Clusium, in Italy, was elected by the Etruscans, according to Varro, for the sepulcher of King Por-senna.

LABYRINTH'ODON, a genus of fossil amphibians, whose remains are found in the carboniferous, permian, and trias formations, those of the trias being found in England, India, and Africa. They were allied to the crocodile and to



Labyrinthodon Salamandroides (restored).

the frog, and were 10 to 12 feet long. The name is derived from the labyrinthine structure of a section of the tooth, when seen under the microscope. The hypothetical cheirotherium has been identified with the Labyrinthodon.

LAC, or **LAK**, from the Sanskrit lakshâ or laksha, that is, 100,000. In the East Indies it is applied to the computation of money. Thus, a lac of rupees is 100,000.

LACE, a delicate kind of net-work, formed of silk, flax, or cotton thread, and used for the ornamenting of female dresses. It is made either by hand or machine, the former being produced by the needle, or made on the pillow. Needle laces are called point, those made on the pillow, cushion, bobbin, or bone laces. A prominent feature in all laces is the pattern or ornament; this may be worked with or without a groundwork. Pillow lace consists of hexagonal meshes, four of the sides of each mesh being formed by twisting two threads round each other, and the other two sides by the simple crossing of two threads over each other. The pattern on parchment or vellum is attached to the pillow, and pins are stuck in the lines of the pattern, round which the threads are plaited and twisted so as to form the required design. Among the laces of this class are Honiton, Buckingham, Mechlin, Valenciennes, etc. Point laces, made entirely by the needle and single thread are known as Brussels, Alençon, Maltese, etc. Guipure lace consists of a net-work ground on which patterns are wrought in various stitches with silk, etc. It was originally a lace made in silk, thread, etc., on little strips of parchment or vellum. At Nottingham and elsewhere imitations of lace are produced by machines, called point net and warp net, from the names of the machines in which they are made. They are both a species of chain work, and the machines are varieties of the stocking-frame. The manufacture of lace appears to have existed from a considerably remote antiquity, as in the representations of Grecian female costume which have come down to us the dresses are frequently ornamented with lace of beautiful patterns. In modern times point lace originated in Italy, from which the manufacture spread to Spain and

Flanders. Pillow lace was first made in the low countries.

LACHRYMAL ORGANS. See Eye.

LACQUER (lak'èr), a varnish usually consisting of a solution of shellac (sometimes sandarach, mastic, etc.) in alcohol colored by arnotto, gamboge, saffron, and other coloring matters, for coating brass and some other metals, to give them a golden color, to preserve their luster, and to secure them against rust. Lacquered brass appears as if gilt, and tin is made yellow. Lacquering is also applied to the coating with varnish of goods in wood and papier-mâché. The Japanese and Chinese excel in works of this kind.

LA CROSSE, a city in Wisconsin, on the Mississippi at the mouth of the Black river and La Crosse, a great seat of the lumber trade. Pop. 32,460.

LA CROSSE, a game at ball, originating with the Indians of Canada, played somewhat on the principle of football, except that the ball is carried on an implement called the crosse, the player



Crosse.

in possession running with it toward the enemy's goal, and when on the point of being caught, passing it by tossing to one of his own side, or throwing it over his head as far in the direction of the goal as possible.

LAC'TEALS, numerous minute tubes which absorb or take up the chyle or milk-fluid from the alimentary canal, and convey it to the thoracic duct.

LACTIC ACID, an acid found in several animal liquids, and particularly in human urine. It is not only formed in milk when it becomes sour, but also in the fermentation of several vegetable juices, and in the putrefaction of some animal matters. It is a colorless, inodorous, very sour liquid, of a syrupy consistence. It coagulates milk.

LACTINE, Lactose, sugar of milk, a substance obtained by evaporating whey, filtering through animal charcoal, and crystallizing. It forms hard, white, semi-transparent trimetric crystals, which have a slightly sweet taste, and grate between the teeth. It is convertible like starch into glucose by boiling with very dilute sulphuric acid.

LACTOM'ETER, or **GALACTOMETER**, an instrument for ascertaining the different qualities of milk. Several instruments of this sort have been invented. One consists of a glass tube 1 foot long, graduated into 100 parts. New milk is filled into it and allowed to stand until the cream has fully separated when its relative quantity is shown by

the number of parts in the 100 which it occupies.

LADRONES (la-drōnz', or la-drō'nes), or Marianne Islands, a group of sixteen islands in the North Pacific ocean, east of the Philippines and the Caroline islands. Guam is the southernmost and largest; next in importance is Rota. The islands are mostly of volcanic origin, and are very rugged, but their general aspect is picturesque, being densely wooded and covered with a perpetual verdure; the soil also is extremely fertile. The climate is humid but moderately warm and not unhealthy. The cocoanut and breadfruit trees are indigenous but sugar, corn, coffee, tobacco and indigo are cultivated. The islands were discovered by Magelhaens in 1521, and long belonged to Spain, but Guam is now American, and others German. Pop. 8000.

LADY-BIRD, the name of a number of small coleopterous insects, or beetles, common on trees and plants in gardens. More than fifty species are known. They are of great service to cultivators on account of the number of aphides or plant-lice which they destroy.

LADYSMITH, a town of Natal, about 80 miles n.n.w. Maritzburg, on a slope near Klip river, and on the railway to Johannesburg, where joined by that to Harrismith. It is famous for the long siege which it stood in the South African war of 1899-1901. Pop. 4500.

LAFAYETTE, Marie Paul Jean Roch Yves Gilbert Motier, Marquis de, was born in Auvergne 1757, died 1834. He commenced his career at the court of Louis XV., at the period when hostilities were commencing between Britain and her American colonies. In 1777 he left France for America, having fitted out a vessel for himself, and was received by Washington and his army with acclamation. He joined their ranks as a volunteer, was wounded near Philadelphia, and commanded the vanguard of the American army at the capture of New York. He returned to France on



Marquis de Lafayette.

the close of the campaign; was called to the Assembly of the Notables in 1787, and was elected a member of the States-General, which took the name of National Assembly (1789). Two days after the attack on the Bastille he was appointed (July 15) commander-in-chief of the national guards of Paris. It was through his means that the lives of the king and queen were saved from the mob that had taken possession of the palace at Versailles. In 1792 he was appointed one of the three majors-generals in the command of the French armies. He declined the dignity of senator

offered him by Bonaparte, and gave his vote against the consulate for life. In 1818 he was chosen member of the chamber of deputies, and was a constant advocate of liberal measures. In 1824 he visited the United States, and was received with great enthusiasm. Congress voted him 200,000 dollars and a township of land. During the revolution of July, 1830, he was appointed general of the National Guards of Paris, and it was chiefly to Lafayette that Louis Philippe owed his elevation to the throne.

LA FAYETTE, a city in Indiana, on the Wabash river and Wabash and Erie Canal, and at the intersection of several railways, 63 miles northwest of Indianapolis. It is the seat of the state agricultural college, and has a number of miscellaneous manufactures. Pop. 21,670.

LAFAYETTE COLLEGE, a flourishing institution at Easton, Pennsylvania, chartered in 1826. It has six degree courses of four years each—three general and scientific, and three technical.

LA FOLLETTE (lā-fōl-lēt'), Robert Marion, American politician, born at Primrose, Wis., in 1855. In 1880 he was nominated by the republicans and elected district attorney of Dane county, of which Madison is the county-seat. This position he held until 1884, after which he practiced law privately until 1887, when he became a member of congress. In 1900 he was nominated and elected governor. His administration was marked by his determined effort to secure reforms for which he had become the champion, namely a primary election law, a reform of taxes on corporations and the regulation of the railroads. In 1902 he was re-elected governor and in 1905 he was elected to the United States senate.

LAFONTAINE (lā-fon-tān), Jean de, French writer, born at Château-Thierry in 1621, died 1695. The first volume of his *Contes* or *Tales* appeared in 1664, a second in 1671. They are full of fine touches of genius, but are grossly indecent. Of his *Fables* (in which animals are represented speaking and acting) innumerable editions have been printed, and it is through them that he is universally known.

LAGER (lā'gēr) **BEER**, a light beer, not so intoxicating as the English pale ales, largely brewed in Germany and Austria. A similar beer is now made by British brewers, and it has for long been largely produced in the United States.

LAGOON, a name given particularly to shallow lakes connected with the sea, which are found along some low-lying coasts, as on that of the Adriatic near Venice.

LAGRANGE (lā-grānz), Joseph Louis, a celebrated mathematician, was born at Turin 1736, and died at Paris 1813. When scarcely nineteen years of age Lagrange was made mathematical professor in the artillery school at Turin. In 1764 he obtained the prize of the Academy of Sciences in Paris for a treatise on the libration of the moon, and in 1776 for another on the theory of the satellites of Jupiter. About this time he made a visit to Paris, where he became personally acquainted with D'Alembert, Clairaut, Condorcet, and

other savants. Soon after his return he received an invitation from Frederick the Great, to whom he had been recommended by D'Alembert, to go to Berlin, with the title of Director of the Academy. Here he lived for twenty years, and wrote his great work *La Mécanique Analytique*. After Frederick's death (1786) the persuasion of Mirabeau and the offer of a pension induced him to settle in Paris. He was the first professor of geometry in the Polytechnic school, and was the first inscribed member of the Institute. In 1794 he was appointed professor in the newly-established Normal School (*Ecole Normale Supérieure*) at Paris (1794), as well as in the *Ecole Polytechnique*. The most important of his works are his *Mécanique Analytique* (1788); *Theorie des Fonctions Analytiques* (1797); *Résolutions des Equations Numériques* (1798); *Leçons sur le Calcul des Fonctions*; and *Essai d'Arithmétique Politique*.

LAHORE, a city of Hindustan, capital of the Punjab, on the left bank of the Ravi, 265 miles northwest of Delhi. The city proper covers an area of 640 acres, and is surrounded by a brick wall 16 feet high, flanked by bastions. Pop. 202,964.—Lahore division (commissionership) has an area of 24,872 sq. miles, and pop. 4,579,794. The Lahore district has an area of 3648 sq. miles; pop. 1,075,379.

LAISSER-FAIRE (lā-sā-fār), in economics, a term applied to the theory that a public authority should interfere in the concerns of a community as little as possible; that wealth tends to be produced most amply and economically where a government leaves individuals free to produce and transfer on mutually arranged terms, confining itself to the protection of property and person and the enforcement of contracts. This rule in practice is limited by various exceptions, as in government interference in the matters of education and the employment of children; in the promotion of health or morality; and in the private economic interests of certain industrial classes.

LAKE, a large sheet or body of water, wholly surrounded by land, and having no direct or immediate communication with the ocean, or with any seas, or having so only by means of rivers. It differs from a pond in being larger. Lakes are divided into four classes: (1) Those which have no outlet, and receive no running water, usually very small. (2) Those which have an outlet, but receive no superficial running waters and are consequently fed by springs. (3) Those which receive and discharge streams of water (by far the most numerous class). (4) Those which receive streams, and which have no visible outlet, being generally salt, as the Caspian Sea and Lake Aral. Lakes are also divided into mountain lakes and plain or plateau lakes.

LAKE-DWELLINGS, the name given to habitations built on small artificial or partly artificial islands in lakes, or on platforms supported by piles near the shores of lakes. The use of habitations of this nature is a subject which has engaged the attention of archaeologists and others very largely since the discovery of the remains of a lake-dwelling

in Ireland in 1839, of similar ones in Switzerland in 1854, and subsequently of numbers of others elsewhere. The archaeological interest thus attaching to these lacustrine remains has drawn attention to the fact of similar dwellings being still used in various parts of the world, in Russia, the Malay Archipelago (Borneo and New Guinea), the Caroline Islands, Lake Maracaybo in Venezuela, New Zealand, and in a modified form in some parts of Central Africa. The first who is known to have described lake-dwellings is Herodotus, who mentions certain dwellings of this kind on Lake Prasias in Thrace as being approached



Lake-dwellings (restored).

by a narrow bridge, each habitation having a trap-door in the floor, giving access to the water beneath, through which fish were caught. A great number of these pile structures have been discovered in the Swiss lakes, some belonging to the iron age, some few even to Roman times; but the greatest number appear to be divided in about equal proportions between the stone and bronze ages. The relics found in these historic buildings have thrown much light on prehistoric man, large populations having occupied these pile-buildings during extended periods of time.

LAKES, pigments consisting of a coloring matter combined with a metallic oxide. They are obtained by mixing with a solution of the coloring matter a solution of alum or of a salt of tin, tungsten, zinc, lead or other metal and then adding an alkali or alkaline carbonate. Among the pigments prepared in this way may be mentioned blue lake, consisting of cobalt, blue, indigo, or ultra marine and alumina; madder lake, of madder and alumina; orange lake, of turmeric and alumina; carmine lake, of cochineal and alumina; purple lake, of log wood and alumina; and so on. Lake pigments are used in painting, calico-printing, and in the manufacture of wallpaper.

LAKHIMPUR (lak-him-pör'), a British district of India, occupying the extreme eastern portion of Assam; area, 3724 sq. miles. Pop. 254,053.

LAMA, in zoology. See Llama.

LA'MAISM, a variety of Buddhism, dating from the 7th century after Christ, and chiefly prevailing in Tibet and Mongolia; so called from the lamas or priests belonging to it. The highest object of worship is Buddha, who is regarded as the founder of the religion, and the first in rank among the saints. The other saints comprise all those recognized in Buddhism, besides hosts of religious teachers and pious men canonized after their death. The clergy are the representatives or re-incarnations of these saints on earth, and receive the homage

due to them. Besides these saints a number of inferior gods or spirits are recognized by Lamaism, and receive a certain worship. The Lamaists have a hierarchy in some respects resembling that of the Roman Catholic Church, and they have also monasteries and nunneries, auricular confession, litanies, etc., and believe in the intercession of the saints and in the saying of masses for the dead. In the hierarchy there are two supreme heads, the Dalai-lama and the Tesho-lama in whom Buddha is supposed to be incarnate. Next in rank to these two grand-lamas are the incarnations of saints, after which follow those of patrons or founders of lamaseries, or Buddhistic monasteries, and then the lower ranks, distinguished merely by talents or learning. The Dalai-lama and



Lama of Tibet.

Tesho-lama are nominally co-equal in rank and authority; but the former from possessing a much larger territory is in reality much the more powerful. The former, whose residence is at Potala near Lassa, is the acknowledged head of the Buddhists not only in Tibet, but throughout Mongolia and China. When either of the two lamas dies, his place may be filled according to directions given by himself before his death, stating into what family he purposed transmigrating. If such directions have not been given, the other procures the names of male children born at the time of the death in order to discover where the deceased has incarnated himself. The question is decided by lot in presence of the surviving grand-lama, and the Chinese political resident and the child whose name is drawn becomes the grand-lama.

LAMAR, Lucius Q. C., American jurist, was born in Putnam co., Ga., in 1825. Was educated at Emory college. He moved to Mississippi, and was elected representative in 1856. In 1861 he resigned and joined the confederate army as colonel. He was professor of law in the University of Mississippi (1867-1872), when he was again sent to congress. In 1876 he was elected senator and was re-elected in 1882. In 1885 he became secretary of the interior in President Cleveland's cabinet, and in 1887 was appointed associate justice of the supreme court of the United States. He died in 1893.

LAMARCK, Jean Baptiste Pierre Antoine de Monet, Chevalier de, French

naturalist, born in Picardy 1744, died at Paris 1829. He became botanist of the Jardin du Roi in 1788, and professor of zoology at the Museum of Natural History in 1793. Other chief works are *Philosophie Zoologique*, in which he promulgated a theory foreshadowing what is now known as the law of evolution; *Histoire Naturelle des Animaux sans Vertebres*, *Tableau Encyclopédique de la Botanique*, etc. He held the doctrine of spontaneous generation, and his religious beliefs have been described as a curious mixture of pantheism and deism.

LAMARTINE (là-mâr-tên), Alphonse Marie Louis Prat de, French poet and statesman, born at Mâcon 1790; died at Passy, near Paris, in 1869. By his first production, *Méditations Poétiques* (1820), he at once obtained a high place among the poets of the day. In 1820 he was attached to the legation at Naples, and married a rich English lady, Eliza Marianna Birch. The *Nouvelles Méditations Poétiques* (1823), and the *Harmonies Poétiques et Religieuses* (1828), established his poetic fame, and obtained for him admission into the French Academy. (1830). After the revolution of July he traveled in the east and on his return published *Voyage en Orient, Souvenirs, Impressions, Pensées et Paysages* (Paris, four vols. 1835). During his absence he had been elected a member of the Chamber of Deputies, and thenceforward his career was as much political as literary. In 1847 he published his *Histoire des Girondins* (Paris, eight vols.), in which he manifested strong republican leanings.

LAMB, Charles, English essayist and humorist, born in London 1775, died at Edmonton 1834. His first appearance as an author was in 1798, when he published a volume of poems in conjunction with his friends Coleridge and Lloyd. His love for 17th century literature bore fruit in the *Tales from Shakespeare* (1807) and *Specimens of English Dramatic Poets who lived about the time of Shakespeare* (1808). He made two attempts at the drama: *John Woodvil*, written in imitation of the early English dramatists; and a farce entitled *Mr. H.* which was performed at Drury Lane in 1806, and proved a failure. On the other hand, his tale of *Rosamund Gray* (Lond. 1798) was well received when it appeared, and is still a favorite. He owes his literary distinction to his delightful *Essays of Elia*, chiefly contributed to the *London Magazine*. They have been frequently republished in a collected form. Here, in a style ever happy and original, he has carried the short humorous essay to a point of excellence perhaps never before attained.—His sister Mary Anne (born 1765, died 1847) was joint author with her brother of *Tales from Shakespeare*, and *Poetry for Children*.

LAMBAYEQUE (lâm-bâ-yâ-kâ), a town in Peru, capital of the department of the same name. Pop. 6248.—Area of department, 17,939 sq. miles; pop. 85,984.

LAMBERT, Daniel, noted for his extraordinary size, was born in Leicester 1770, died 1809. He was exhibited in London and the principal towns of England, and at the time of his death was 5 feet 11 inches in height, weighed

739 lbs. (over 52½ stones), and measured 9 feet 4 inches round the body, and 3 feet 1 inch round the leg.

LAMBERT'S PINE, a North American pine growing in California, and sometimes reaching the height of 300 feet. It yields when burned a sugary substance known as California manna. The leaves are in fives; the cones are 14 to 18 inches long, and contain edible seeds.

LAMBETH, a mun. and parl. borough of South London, opposite to Westminster, with which it is connected by a bridge 1040 feet long. Lambeth Palace, the official residence of the archbishops of Canterbury, contains a library with 30,000 volumes and upward of 14,000 manuscripts. St. Thomas's hospital is situated on the Albert embankment, opposite the houses of parliament. Pop. 301,873.

LAMENTATIONS, the name given in the authorized version of the Scriptures to a pathetic poem made up of five distinct elegies. They appear in the Hebrew canon with no name attached, but ancient tradition, internal evidence, and a prefatory verse which appears in the Septuagint point to the authorship of Jeremiah. The first four of the dirges are alphabetical acrostics, successive verses, or in chap. iii. successive sets of three verses, beginning alphabetically. Chap. v. is not in acrostic form. According to Josephus, Jerome, and also some modern critics these poems were written on the death of King Josiah (see 2 Chron. xxxv. 25), but the contents of the book itself plainly show that a national calamity—the destruction of Jerusalem and the overthrow of the Judean state by the Chaldeans—is referred to.

LAMMERGEIER (lem'ér-gî-ér; German, "lamb vulture"), the bearded vulture, a bird of prey of the genus *Gypaëtus*, family *Vulturidae*, forming a link between the vultures and the eagles. It inhabits the Swiss and German Alps, as well as the higher mountains of Asia and Africa, and is the largest European bird of prey, measuring upward of 4 feet from beak to tail, and 9 or 10 in the expanse of its wings. Besides eating carrion, it preys on living chamois, lambs, kids, hares, and such like animals, but it does not disdain when pressed rats, mice, and other small quadrupeds.

LAMONT (là-mönt'), Daniel Scott, American politician and cabinet officer, was born at Cortlandville, N. Y., in 1851. In 1883 he became private secretary to Grover Cleveland, then governor of New York. When Cleveland became president in 1885, Lamont accompanied him to Washington, where he remained until Harrison's inauguration. From 1889 to 1893 he engaged in various business enterprises in New York City, and in the latter year became secretary of war in President Cleveland's second cabinet. In 1897 he became vice-president of the Northern Pacific Railway. He died in 1905.

LAMP, a contrivance for producing artificial light, whether by means of an inflammable liquid, or of gas, or electricity; but usually the term applied to a vessel for containing oil or other liquid inflammable substance, to be burned by

means of a wick. Baked earth was probably the substance of which the earliest lamps were composed, but subsequently we find them of various metals—of bronze more particularly. Modern lamps vary in form and principle widely, and of late have been constructed in a variety of materials. The requisite properties of a perfect lamp are these:—1st, It must be supplied with carbonaceous matter and with oxygen; 2d, It must convert the former into a gaseous state; and 3d, It must bring the gas so produced in contact with oxygen at such a temperature that the carbon will combine with the oxygen in the fullest degree to produce the greatest quantity of flame without any smoke. Until 1784 all the lamps in use were far from meeting all these requirements. In that year an improved scientific lamp was constructed by Aimé Argand of Geneva, and called after him the Argand lamp. In this lamp defective consumption is remedied by using a circular wick, the flame of which is nourished by an internal as well as an external current of air, and by placing a glass chimney above the flame so as to increase the draught. A special arrangement ensures a uniform supply of oil. In the improved lamps that have succeeded that of Argand, the Argand burner has generally been retained, and the alterations have chiefly been made in the mode of keeping up a uniform supply of oil. For petroleum, paraffin, and other mineral oils, which have of late years come into very extensive use for illuminating purposes, a very simple kind of lamp is used. The oil-vessel is placed below the burner, which usually consists of a simple slit, down which a broad wick passes into the oil. The wick may be raised or depressed by a screw, and when the lamp is burning is kept a short distance below the opening of the slit. The oil is sucked up by the wick by the action of capillarity. A chimney is fitted on to the lamp, and creates so powerful a draft that the flame is kept perfectly steady, and the gas proceeding from the heating of the oil is completely consumed. There is an endless variety of lamps of this kind, the special features aimed at being increase of light by improved burners and immunity from explosion. Safety-lamps are used for mines (see Safety-lamp). Hydro carbon lamps are used for magic-lanterns, etc. The magnesium lamp, chiefly used by photographers is one constructed for the combustion of magnesium wire. A lantern is a form of lamp, generally a case inclosing a light and protecting it from wind and rain, sometimes portable and sometimes fixed.

LAMPBLACK, a fine soot formed by the condensation of the smoke of burning oil, pitch, or resinous substances in a chimney terminating in a cone of cloth. It is used in the manufacture of pigments, blacking, and printing inks. See Carbon.

LAMP'PREY, the name of several eel-like, scaleless fishes which inhabit both fresh and salt water. The lampreys have seven spiracles or apertures on each side of the neck, and a fistula or aperture on the top of the head; they have no pectoral or ventral fins. The mouth is in

the form of a sucker, lined with strong teeth and cutting plates, and the river lampreys are often seen clinging to stones by it. The marine or sea lamprey is sometimes found so large as to weigh 4 or 5 lbs. It is of a dusky brown, marbled with yellowish patches. It ascends rivers in the spring for the purpose of spawning, and was formerly



Sea Lamprey.

much valued as an article of food. The river lamprey or lampren is a smaller species, and abounds in the fresh-water lakes and rivers of northern countries. It is colored black on its upper, and of a silvery hue on its under surface. Lampreys attach themselves to other fishes and suck their blood; they also eat soft animal matter of any kind.

LAN'ARK, Lanarkshire, or Clydesdale, a southwestern county of Scotland, and the most populous in the country. It is bounded by the counties of Dumbarton, Stirling, Linlithgow, Edinburgh, Peebles, Dumfries, Ayr, and Renfrew; area, 564,284 acres, of which about one-third is under cultivation. Pop. 1,339,327.—Lanark, the town, is a royal and parliamentary burgh. Pop. 6440.

LAN'CASHIRE, or the county palatine of Lancaster, a maritime county in the n.w. of England, bounded by Westmoreland, Cumberland, Yorkshire, Cheshire, and the Irish Sea, a part of it in the north, called Furness, being cut off from the rest by Morecambe Bay; area, 1,207,926 acres, of which over 800,000 acres are in cultivation. Lancashire is the grand seat of the cotton manufacture, not only of England, but also of the world, Manchester being the principal center. Woolen goods are also largely produced, as are also machinery of all descriptions, and a vast variety of other articles. Liverpool is the great shipping port of the county and of England. Lancaster is the county town, but there are a great many others far larger, such as Liverpool, Manchester and Salford, Oldham, Bolton, Blackburn, Preston, etc. Pop. 4,406,787.

LAN'CASTER, a municipal borough and river-port, England, the county town of Lancashire, on the left bank of the Lune, 45 miles north by east of Liverpool. Pop. 40,329.

LANCASTER, a city in Pennsylvania, capital of Pennsylvania county, 68 miles west of Philadelphia. It is a pleasant residential city; has very extensive manufacturing interests, and is a chief tobacco-leaf market. It is also the center of a rich wheat district, and carries on an extensive lumber trade. Pop. 50,000.

LANCASTER, the capital of Fairfield co., Ohio, on the Hocking river, about 32 miles s.e. of Columbus. It has iron-foundries, flouring-mills, and manufactures of machines and agricultural implements. Pop. 10,760.

LANCASTER, House of, the name given in English history to designate the line of kings—Henry IV., V. and VI., immediately descended from John of

Gaunt, fourth son of Edward III. Edmund, second son of Henry III., was created Earl of Lancaster and Leicester. His son Thomas added Derby and Lincoln to his titles, became leader of the baronial opposition to Edward II., and was beheaded for treason. His grandson was advanced to the dignity of a duke, and dying without male issue, the inheritance fell to his daughter Blanche, who became the wife of John of Gaunt.

LANCASTER, John of Gaunt, Duke of. See John of Gaunt.

LANCASTER SOUND, a passage leading from the northwest of Baffin's Bay west to Barrow's Strait. It was discovered by Baffin in 1616, is about 250 miles long, with a central breadth of about 65 miles.

LANCE, a weapon consisting of a long shaft with a sharp point, much used before the invention of firearms, and still in use. It was common among the Greeks and Romans. The Macedonian phalanx was armed with it, and it was the chief weapon of the Roman infantry. The javelin, or pilum, was but secondary. The lance was the chief weapon in the middle ages, and was especially the arm of knighthood. The introduction of firearms gradually led to the disuse of the lance in the West of Europe, though it continued among the Turks, Albanians, Tartars, Cossacks, Poles, and Russians and other Slavonic tribes. Napoleon organized several regiments of Polish lancers for service in his army, and now most of the armies of Europe have regiments of Uhlans or lancers.

LANCERS. See Lance.

LAND forms an important kind of natural wealth susceptible of appropriation, and forming at the same time the principal deposit of the accumulated capital derived from the labor of preceding generations. In Britain, from various causes, among others the enormous cost of transfer, the land is in the hands of comparatively a few owners, and the properties are generally large. One-half of the land of the United Kingdom is in the hands of 7400 individuals; the other half being owned by 312,500 individuals. Barely one in a hundred of the population owns more than an acre of soil. The cultivable land is usually let out to tenant-farmers, who cultivate it at their own expense. These number upwards of 1,160,000 in Great Britain and Ireland, more than three-fourths of whom occupy farms of less than 15 acres. In the British colonies small properties rather than large is the rule. In France there are about 3,000,000 properties under 25 acres, and only 150,000 above 100 acres; 1,750,000 of the population cultivate their own land. Small holdings cultivated by the owners are common in Germany, Belgium, Switzerland, Denmark, Norway, Sweden, and other parts of Europe. In the United States the land is chiefly cultivated by small owners. There are still about 1,000,000,000 acres undisposed of notwithstanding that over 700,000,000 acres have been withdrawn by the government from the public domain.

LAND, Tenure of. The various species of tenures and customs relating to property in land are noticed under the particular heads. See Allodium Feudal

System, Freehold, Copyhold, Entail, etc.

LAND-CRABS, crabs so called from their semi-terrestrial mode of life; their habits leading them to live on land, and away from the sea, even for considerable periods of time. The true land-crabs occur in Asia, particularly in the Eastern Archipelago; in America, and specially in the West Indian Islands; and in Australia also. The best-known species is found in the higher parts of Jamaica, which often proves very destructive to the sugar plantations. The crabs of the genus represented by the common species and inhabiting the West Indian mangrove swamps and marshes, appears to feed upon both vegetable and animal diet.

LANDES, a maritime department of France, bounded by the Bay of Biscay and by the departments of Gironde, Lot-et-Garonne, Gers, and Basses-Pyrénées. It has an area of 3599 sq. miles. Pop. 291,586.

LANDGRAVE, in Germany, originally about the 12th century, the title of district or provincial governors deputed by the emperor and given them to distinguish them from the inferior counts under their jurisdiction.

LAND LEAGUE, an organization projected by Mr. Parnell, the leader of the Irish national movement, in 1879, the ostensible object of which was to purchase the land of Ireland for the people of Ireland. Funds were largely subscribed, especially in America, but the stringent rules against landlords and tenants holding aloof from it, and the alleged complicity of its members with many terrible outrages, caused it to be suppressed in 1881.

LANDLORD AND TENANT, the landlord in relation to a tenant is the person from whom lands or tenements are taken on lease or by some other contract or agreement. The tenant is the person who holds lands or tenements of another by any kind of contract or agreement, usually for a periodical rent. In the absence of express agreement a tenant may sublet the property, but he is still liable to the landlord for the rent, unless the landlord relieves him by accepting the sub-tenant as a tenant-in-chief. Rent may be recovered by action at law, by ejectment, or by distress on the premises. The landlord is responsible for maintaining a house in a fit state of repair, and if he neglects to do so the tenant may withhold the rent or deduct the expense of repairs. The landlord has a hypothec over the furniture for rent occurring before the term of payment has arrived, and may prevent its removal but he has no lien over the goods of a sub-tenant who has paid his rent to his immediate landlord.

LANDOR, Walter Savage, an English poet and prose writer, born at Ipsley Court, Warwickshire, 1775; died 1864. His fame chiefly rests on his Imaginary Conversations, between celebrated persons of ancient and modern times, which is a model of a pure, vigorous finished English style.

LANDSCAPE, a term applied to a portion of land or territory which the eye can comprehend in a single view, and to a painting of such. See Painting.

LANDSCAPE GARDENING, is the art of laying out grounds, arranging trees, shrubbery, etc., so as to bring into harmonious combination all the varied characteristics and surroundings. It disposes flowering plants, shrubs, and trees over varying levels in such a manner as to produce the most pleasing effects, it shuts out undesirable views by means of judicious planting, and introduces rock-work, water, and other artistic embellishments where the local peculiarities of the ground permit.

LANDSEER, Sir Edwin, painter, born in London 1802, died 1873. He began to draw animals when a mere child; at thirteen he exhibited at the Academy, and the year following became a student. Henceforward he exhibited regularly at the Academy and the British Institution. In 1826 he was elected A.R.A.; in 1830 R.A.; in 1850 he was knighted, and in 1865 he declined the presidency of the Academy. He takes the very highest rank among animal painters; and though he has been blamed for introducing too human a sentiment and expression into some of his animals, the humor and pathos of animal nature has had no finer exponent.

LANDSLIP, the slipping or sliding of a considerable tract of land or earth from a higher to a lower level. Landslips are due to a variety of causes, chiefly the decay of supporting strata, or excessive saturation of the soil by rain. Among the more disastrous occurrences of this kind are the slip of the Rossberg Mountain behind the Rigi in Switzerland in 1806, burying villages and hamlets with over 800 inhabitants; and that at Naini Tal, a sanitary hill-station in the Himalayas, in 1880, when 230 lives were lost.

LAND-SURVEYING. See Surveying.

LAND-TAX, a tax levied on land. What is known as the land-tax in Britain was imposed in the reign of William III. as a substitute for escuage, talliage, fifteenths, and other contributions. It was imposed annually from 1693 to 1798 at a varying rate, oftenest \$1.00 per lb. In the latter year it produced about \$10,000,000, when it was replaced by a perpetual rent charge on land, with power of redemption, and a tax annually imposed on personal property, the latter tax abolished in 1833. The land-tax now produces rather more than \$5,000,000 annually. In the United States land bears a large share of local taxation either under the general property tax or under a tax upon real estate. In the general property tax no distinction is made between landed property and other possessions.

LAND TORTOISE, the land tortoises are easily recognized by their feet, in which the toes are short, without webs, and the hinder ones "clubbed," while the front of the fore limbs is protected by strong horny scales, or frequently by dermal ossifications. The carapace of the shell is usually heavy and highly arched, and the plastron is firmly united to it at the sides of the body. The top of the strong shell is covered with shields, the tail is short.

LANDWEHR (lânt'vâr), that portion of the military force of Germany and other European nations which in time of peace follow their ordinary occupa-

tions, excepting when called out for occasional training. The landwehr in some respects resembles a militia, with this important difference, that all the soldiers of the landwehr have served in the regular army. This system has received its fullest development in Germany, in which country it adds enormously, and at comparatively little cost, to the military power of the state.

LANGLEY, Samuel Pierpont, American astronomer, born at Roxbury, Mass., in 1834. In 1867 he became professor of astronomy at the Western University of Pennsylvania and secretary of the Smithsonian Institution in 1887. His solar observations, made at Pike's Peak in 1878, at Mount Etna in 1878-79, and at Mount Whitney, Cal., in 1881, added greatly to our knowledge of the phenomena of solar heat. He invented the bolometer, a very delicate instrument for the measurement of radiant heat. In 1886 he became president of the American Association for the Advancement of Science, and in 1894 received the degree of D.C.L. from Oxford University. He is also a member of the Royal Society of London, and many other foreign societies. He has been awarded the Janssen medal of the Institute of France and the Rumford medal of the Royal Society of London. He died in 1906.

LANGTRY, Mrs. Lillie, English actress born at Le Breton in 1852. She was noted for her beauty as the Jersey Lily. She made her debut in 1881 at the Haymarket theater, London, in *She Stoops to Conquer*. In 1882 she made her first appearance in America with a popular success which has been repeated on subsequent occasions.

LANIER, Sidney, American poet, was born in Macon, Ga., in 1842. He served in the confederate army during the war. In 1876 he prepared an ode for the centennial exhibition at Philadelphia, and in October, 1877, settled in Baltimore, where he delivered lectures on English literature. In 1879 he was appointed lecturer on English literature at Johns Hopkins University. His two notable books are his *Science of English Verse*, and his *Poems*. He died in 1881.

LANGUAGE. See Philology.



Lanner.

LANNER, the *Falco lanarius*, species of hawk, especially the female

the species, the male being called a lanneret. It is a native of Southern Europe, North Africa, and Southwest Asia, and was much valued in falconry.

LANDSDOWNE, Henry Charles Keith Fitz-Maurice, Marquis of, was born 1845, and succeeded to the marquise in 1866. He has been a lord of the treasury and under-secretary for war and for India. Governor-general of Canada in 1883-88, of India, in 1888-93, secretary for war in 1895-1900, he became foreign secretary in 1900.

LANSING, the capital of Michigan, on Grand river, 85 miles n.w. of Detroit. It contains a large and handsome state-



State capitol, Lansing, Mich.

house, an agricultural college, etc., and is an important manufacturing center. Pop. 19,645.

LANSINGBURGH, a town, in New York, Rennselaer co., on the east bank of the Hudson, nearly opposite its confluence with the Mohawk. Pop. 14,040.

LANTERN. See Lamp.

LANTERN-FLIES; insects forming a family remarkable for the prolongation of their forehead into an empty vesicular expansion. The lantern-fly proper is a native of South America. It is more than 3 inches in length, and 5 across the wings. It has been asserted that it emits a strong light from the inflated expansion of the forehead, but the evidence of this luminosity is more than doubtful. They are in fact reported to fly only during sunlight and not to appear abroad during dark.

LAOCOON (lā-ok'o-on), in ancient Greek legend, a priest of Poseidon (Neptune), among the Trojans, who, along with his two sons, was killed by two enormous serpents sent by Apollo. The story has frequently furnished a subject to the poets, but it is chiefly interesting as having served as the subject of one of the most beautiful groups of sculpture in the whole history of ancient art. It was discovered at Rome among the ruins of the palace of Titus in 1506, and is now placed in the Vatican. It is supposed to be the group described by Pliny as the work of three sculptors of Rhodes, a father and two sons, Agesander, Polydorus, and Athenodorus, but doubts exist as to its date.

LA PAZ, or **LA PAZ DE AYACUCHO**, a town of Bolivia, capital of a department of the same name. Pop. 60,000.—The department has an area of 45,000 sq. miles and a population estimated at 365,000

LAPLACE (lā-pläs), Pierre Simon, Marquis de, a celebrated French mathematician and astronomer, born 1749 died 1827. At the early age of twenty-four was admitted into the Academy of Sciences. Besides his mathematical work he was associated with Lavoisier in chemical research. In 1816 he was named a member of the French Academy. Almost any one of Laplace's original researches is alone sufficient to stamp him as one of the greatest of mathematicians. The discovery of the invariability of the major axes of the planetary orbits, the explanation of the great inequality in the motions of Jupiter and Saturn, the solution of the problem of the acceleration of the mean motion of the moon, the theory of Jupiter's satellites, and other important laws are due to Laplace. The most important of his works are the *Mécanique Céleste*; *Système du Monde*, a résumé of all modern astronomy; *Théorie analytique des Probabilités*; *Essai sur les Probabilités*.

LAPLAND, the land of the Lapps, an extensive territory in the north of Europe, stretching between lat. 64° and 71° n., and from the shores of Norway east to those of the White Sea; area about 130,000 sq. miles, of which more than a half belongs to Russia, and the remainder is shared, in nearly equal proportions, between Sweden and Norway. The climate for nine months of a dark winter is excessively cold; spring

Republic, situated on the shores of a fine natural harbor called Ensenada, in the La Plata estuary, 40 miles below the city of Buenos Ayres, and connected with it by rail. Although recently founded as the capital of Buenos Ayres province, it has already become an important commercial center, having a palace for the legislative assembly, a cathedral, law courts, theater, public park, etc. Pop. estimated at 45,410.

LAPORTE, the capital of Laporte co., Indiana, 60 miles southeast of Chicago. The neighborhood has become a favorite resort of summer visitors on account of its beautiful lakes. Pop. 10,000.

LAPWING, a bird belonging to the family of plovers. The common lapwing



Lapwing.

is about the size of a pigeon; it is often called the peewit from its particular cry. In the breeding season these birds disperse themselves over the interior of the country, where they lay their eggs in a small depression of the ground, in cul-



Laplanders.

and autumn are short; and the summer of two months, when the sun never sets, is extremely hot. Vegetation is scanty except in the form of birch, pine, fir, and the abundant mosses which supply food for the herds of reindeer. The Lapps belong to the Finnic branch of the Turanian family. They are a small, muscular, large-headed race, with high cheek-bones, wide mouth, flat nose, and scanty beard. Many of them are nomadic, owing their subsistence to their herds of reindeer; others support themselves by fishing. They are generally ignorant, simple-hearted, and hospitable. The Norwegian Lapps belong to the Lutheran, and the Russian Lapps to the Greek Church. Their numbers do not exceed 27,000.

LA PLATA. See Argentine Republic.

LA PLATA, a city of the Argentine

tivated fields, moors, etc. In winter they retire to the sea-coast. Their eggs are esteemed a great luxury.

LAR'AMIE, a town of Wyoming, in the southeast of the state in an elevated region, at the height of 7100 feet. Here are the Laramie plains, river, and mountains. Pop. 11,200.

LARBOARD, the left side of a ship looking toward the stern, now called the port side.

LAR'CENY, is the fraudulent appropriation of the personal property of another person without that person's consent. To constitute this crime the removal of the goods to any distance is not necessary, but it requires to be shown that the article has completely passed, for however short a time, into possession of the criminal. Concerning the kinds of things the appropriation of

which is larceny, the common law restricted them to personal property as distinguished from real estate, but this distinction has been largely abolished by recent statutes. Larceny was formerly divided into two kinds, grand and petty, or the difference between articles above and below the value of a shilling, but this distinction has now been abolished. At one time the punishment for grand larceny was death; later it was restricted to transportation; now the punishment for larceny is imprisonment or penal servitude, and depends on the previous character of the prisoner.

LARCH, the common name of trees having deciduous leaves, small erect oval blunt-pointed cones, and irregularly margined scales. This genus is now usually united to *Abies*.

LAR'COM, Lucy, American poetess, born at Beverly, Mass., in 1826. She contributed to the *Lowell Offering*, a periodical which existed about 1840-45 as a literary journal for the mill operatives. Her work attracted the notice of Whittier, with whom she afterward compiled *Child-Life and Songs of Three Centuries*. In 1865 she became assistant editor (and from 1866 to 1874 editor) of *Our Young Folks*, since merged in the *Saint Nicholas*. She died 1893.

LARD, is obtained from the fat of swine when it is heated to boiling point and then strained. It is chiefly composed of oleine and stearine, and is now largely used in the manufacture of candles, soap, pomades, etc. The best quality is found in the fat which surrounds the kidneys, and this is employed in pharmacy for the preparation of unguents. When subjected to pressure the oleine is liberated, forming lard-oil, which is much used as a lubricant for machinery.

LAREDO (lā-rā'dō), the county-seat of Webb co., Texas, 153 miles southwest of San Antonio; on the Rio Grande, opposite Nuevo Laredo, with which it is connected by bridges, and on the International and Great Northern, the Mexican National, and other railroads. Pop. 15,560.

LARE'DO, the capital of Webb co., Tex., on the Rio Grande river, and the Int. and Gt. N., the Mex. Nat. and the Rio G. and Eagle Pass railways; opposite Nuevo Laredo, Mexico, with which it is connected by two steel bridges; 153 miles w. of San Antonio. It is in the Rio Grande coal region. Pop. 14,675.

LARK, the common name of birds characterized by a short, strong bill; nostrils covered with feathers; forked tongue; long, straight hind-claw; and the power to raise the feathers on the back part of the head in the form of a crest. Their distribution throughout the Old World is general, but the only species found in America is the Shore-lark. They are terrestrial in their habits, feed upon worms, larvæ, etc., nest upon the ground and bring forth a brood twice in the year. The best known is the sky-lark, which is celebrated for the prolonged beauty of its song. The wood-lark is less common than the sky-lark, and is known by its smaller size and less distinct colors. It perches upon trees, and is found chiefly in fields near the borders of woods. It

sings during the night, and on this account has been mistaken for the night-ingale.

LARKSPUR, sometimes called Lark's-heel, a genus of plants distinguished by its petaloid calyx, the superior sepal of which terminates in a long spur. The Upright Larkspur and the Branching Larkspur are well-known garden flowers.

LA ROCHEFOUCAULD (rōsh-fō-kō), François, duc de, Prince de Marsillac, a distinguished courtier and man of letters under Louis XIV., was born at Paris in 1613, died 1680. His *Mémoires*, published in 1662, and his *Réflexions ou Sentences et Maximes Morales*, published anonymously in 1665, were the fruits of his literary activity. For its brilliancy of style, it is still considered a French classic.

LA ROCHELLE. See Rochelle.

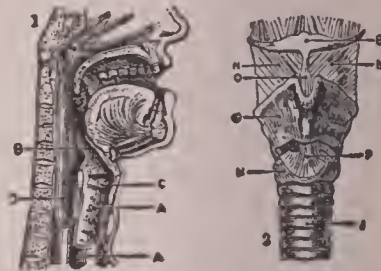
LARVA, the term applied in natural history to the first stage in the metamorphosis of insects, and certain other of the lower invertebrates. In insects it is equivalent to the grub or caterpillar stage. Many of the crustacea, as crabs and barnacles, and even vertebrata, as in frogs and newts, pass through larval forms. The larval crab was for long described as a distinct crustacean with the name of *Zoëa*. See *Metamorphosis*.

LARYNGITIS, inflammation of the mucous membrane lining the larynx. It may be acute or chronic. The first usually arises from a cold.

LARYNGOSCOPE, a contrivance for examining the larynx and commencement of the trachea. It consists of a plane mirror introduced into the mouth, and placed at such an angle that the light thrown on it from a concave reflector, in the center of which is an aperture, is made to illuminate the larynx, the image of which is again reflected through the aperture in the reflector to the eye of the observer.

LARYNX, the organ by which the voice is produced, situated at the upper part of the trachea or windpipe. The larynx is formed mainly of two pieces of cartilage, called the thyroid and the cricoid, one placed above the other. The thyroid is formed of two extended wings meeting at the middle line in front in a ridge; above and from the sides two horns project upward, which are connected by bands to the hyoid bone, from which the larynx is suspended. The thyroid cartilage rests and is movable upon the cricoid, moving backward or forward, but not from side to side. The cricoid cartilage is shaped like a signet-ring, the narrow part of the ring being in front. The cricoid carries, perched on its upper edge behind, the arytenoid cartilages, which are of great importance in the production of the voice. These various cartilages form a framework upon which muscles and mucous membranes are disposed. The mucous membrane which lines the larynx is thrown into various folds. These folds are called the true vocal cords, and by their movements the voice is produced. They are called true, as distinct from the false vocal chords which are above them, but take no part in producing the voice. The true vocal cords projecting toward the middle form a chink, which is called the glottis. By

the contraction of various muscles this chink can be so brought together that the air forced through it throws the edges of the membrane into vibration and so produce sounds. Variations in the form of the chink will affect changes in the sound. Thus the production of voice is the same as in musical instruments, the arrangements in the larynx being such as to produce (1) the vibratory sounds, (2) to regulate the sound, (3) to vary the pitch, and (4) to determine the quality of the sound. The rapid, delicate, muscular movements involved are produced by nervous stimuli reaching the muscles from the brain. Thus the voice is produced in the



Larynx internally (1) and externally (2).

larynx, and is modified by the rest of the respiratory passages. (See *Voice*.) In the act of swallowing, the glottis is covered by a cartilaginous plate called the epiglottis.—In the accompanying cut, fig. 1 shows c the larynx internally, b being the epiglottis situated above the glottis or entrance to the larynx, aa the trachea, and d the oesophagus or gullet. In fig. 2 j is the trachea, b the hyoid bone, nn the thyreo-hyoid membrane, o the thyreo-hyoid ligament, c the thyreoid cartilage, h the cricoid cartilage, p the crico-thyreoid ligament.

LA SALLE, a thriving city, the capital of La Salle co., Illinois, on the north bank of the Illinois river, 100 miles southwest of Chicago. It has zinc smelting works and rolling-mills. There is a good supply of bituminous coal in the neighborhood. Pop. 12,446.

LA SALLE, Robert Cavelier, Sieur de, a French explorer in North America, was born at Rouen in 1643. He became a settler in Canada, and about 1669 he



La Salle.

sought to reach China by way of the Ohio, supposing, from the reports of Indians, this river to flow into the Pacific. He made explorations of the country between the Ohio and the lakes, but, when Joliet and Marquette made it evident that the main river Mississippi

emptied in the Gulf of Mexico, he conceived a vast project for extending the French power in the lower Mississippi valley. Toward the close of 1681 La Salle reached the head of Lake Michigan, at the present site of Chicago, and, making the long portage to the Illinois, descended it to the Mississippi, which he followed to its mouth, where he set up a cross and the arms of France, April 9, 1682. La Salle fell sick on his voyage up the river, and sent on intelligence of his success, which was carried to France by Father Membré, and was published in Hennepin's work in 1683. When La Salle reached France, projects were taken up by the government for an expedition against the rich mining country of northern Mexico. Plans were submitted by La Salle and by Peñalosa, a renegade Spaniard, who, while governor of New Mexico in 1662, had penetrated apparently to the Mississippi. La Salle was accordingly sent out in July, 1684, with four vessels and a small body of soldiers, ostensibly to found an establishment at the mouth of the Mississippi, but really to push on and secure a favorable base of operations, and gain the aid of the Indians against the Spaniards, while awaiting a more powerful force under Peñalosa. The design was so well masked, and subsequently misrepresented, that he is generally said to have been carried beyond the Mississippi by the treachery of Beaujeau, a naval officer commanding one of the vessels. After running along the coast, La Salle returned to Espiritu Santo Bay, Texas. There he landed his soldiers, but lost one vessel with valuable stores. He refused Beaujeau's offer to obtain aid for him from the West Indies, and when that officer, according to his orders, sailed back, La Salle put up a rude fort. Then for two years, from January, 1685, to January, 1687, he wasted the time in aimless excursions by land, never getting beyond the present limits of Texas, and making no attempt to explore the coast or reach the Mississippi with his remaining vessel. His colonists and soldiery dwindled away; no reinforcements or expedition under Peñalosa arrived; and in January, 1687, leaving part of his force at Fort St. Louis, he set out with the rest to reach Canada by way of the Mississippi to obtain relief. His harshness and arbitrary manner had provoked a bitter feeling among his followers, and he was assassinated on March 19th, near the Trinity river. Some of the survivors reached Tonty's post on the Arkansas, and returned to France by way of Canada. The party left at the fort were nearly all cut off by the Indians, a few survivors having been rescued by a Spanish force sent to root out the French.

LASCAR, the name applied by Europeans to native East Indian sailors, many of whom are now employed in the mercantile marine.

LAS CASAS, Bartolomé de, a Spanish prelate, known as the Apostle of the Indians, born 1474, died 1556. He accompanied Columbus to Hispaniola in 1498, and on the conquest of Cuba received charge as priest there, and distinguished himself for his humane treatment of the natives. In his zeal for the

Indians he returned to Spain several times and obtained decrees in their favor, which, however, were of little avail. In the cause of religion he visited various parts of the New World, including Mexico, Guatemala, Peru, etc. In 1542 he wrote his famous *Brevissima Relacion de la Destruccion de las Indias*. He died at Madrid.

LAS CASES (lās cās), Emmanuel Auguste Dieudonné Marin Joseph, Comte de, French writer, born in 1766, died in 1842. After Waterloo he shared Napoleon's imprisonment in St. Helena, where the emperor dictated part of his *Memoirs* to Las Cases, and took lessons from him in English. Removed to the Cape of Good Hope from St. Helena for sending out a secret letter, he was permitted to return to France after Napoleon's death, where he published the *Mémorial de St. Hélène* in his *Atlas Historique*.

LASSA, or **LHASSA**, the capital of Tibet, situated on the Kitchu, a tributary of the Brahmaputra. Pop. of city and suburbs estimated at 50,000.

LASSALLE (lā'sāl-lé), Ferdinand, a notable German socialist, born at Breslau 1825, of Jewish parents; studied at Berlin university; first made himself known as a leader during the democratic troubles of 1848, and was imprisoned for a year. In 1861 he published his *System of Acquired Rights*. Thereafter he proceeded to organize the working-classes, which caused the government to accuse him of sedition, and he was imprisoned for four months. In May, 1863, he founded a Labor Union, and began that socialist propaganda which has since become so wide-spread in Germany. In the summer of 1864 he sought rest in Switzerland, and was there killed in a duel occasioned by a love affair.

LASSO, a contrivance used in Spanish America, consisting of a long rope of plaited rawhide, at one end of which is a small metal ring. By means of this ring a noose is readily formed, and the lasso, or lariat, is then used for catching wild cattle, the rope being cast over the animal's head or leg while the hunter is in full gallop.

LAS VEGAS (lās-vā'gās), the county-seat of San Miguel co., N. M., 83 miles (40 in a direct line) east of Santa Fé; on the Gallinas, a branch of the Pecos river, and on the Atehison, Topeka and Santa Fé railroad. It includes two parts solidly built together—an unorganized section, the old Mexican town, which is the county-seat; and, lying to the east, the modern quarter, incorporated in 1888 under the name East Las Vegas, this town in 1896 becoming the city of Las Vegas. Las Vegas is an important wool market, and the commercial center for the adjacent country, which is interested principally in farming and stock-raising. The famous Las Vegas Hot Springs, a popular health resort 6765 feet above sea level, is six miles distant. Pop. 10,121.

LATEEN' SAIL, is a triangular sail used in xebecs, feluccas, etc., in the Mediterranean, and in the dahabeahs of the Nile. It is extended by a lateen yard, which is slung across a mast so as to make an angle of about 45 degrees with it, the lower portion of the yard being about a third of the whole.

LATENT HEAT, that portion of heat which exists in any body without producing any effect upon another or upon the thermometer; termed also insensible as distinct from sensible heat. It becomes sensible during the conversion of vapors into liquids, and of liquids into solids; and on the other hand a portion of sensible heat disappears or becomes latent when a body changes its form from the solid to the liquid, or from the liquid to the gaseous state.

LATHE, a machine for turning and polishing flat, round, cylindrical, oval, and every intermediate form of body in wood, ivory, metals, etc., the object worked on receiving a rotary motion; it is also used in glass-cutting and earthenware manufacture. It may be turned by



Lateen sail.

the hand, the foot, steam-power, water, etc. A duplex lathe is one which works on two turning tools at once; Blanchard's lathe is one for turning objects of an irregular form, as lasts, gun-stocks, etc. A throw-lathe is one in which the mechanic drives the lathe with one hand, holding the cutting tool with the other.—The term is also applied to the batten or lay of a loom in which the reed is fixed, and by the movements of which the weft-threads are laid parallel to each other, shot after shot, in the process of weaving.

LA'THROP, George Parsons, American journalist and poet, born at Oahu, Sandwich Islands in 1851. He was from 1875 to 1877 assistant editor of the *Atlantic Monthly*; then till 1879 editor of the *Boston Courier*. He published: *Rose and Roof Tree*, poems; *Study of Hawthorne*; *Afterglow*, a novel; *A Masque of Poets*; an edition of Nathaniel Hawthorne's Works, with a biography; *Spanish Vistas*; *Gold of Pleasure*; *Dreams and Days*. He died in 1898.

LATHROP, Rose Hawthorne, American poet and philanthropist, was born at Lenox, Mass., in 1851. She married George Parsons Lathrop in 1871. She wrote many stories and sketches; a volume of poems, *Along the Shore* and *Memories of Hawthorne*, with her husband. In 1896 she established in New York City Saint Rose's Free Home for Cancer; and soon after, with the title of Mother Mary Alphonsa, she became head of a Dominican community of the Third Order and director of a charitable home in that city.

LATHS AND LATHWOOD. Small strips of wood, thin and narrow. They are of various lengths, rarely more than four feet, and are made either by splitting lathwood, which is the Norway

spruce fir, or else they are sawn from the small portions of the lumber. Laths are used for nailing to the uprights of partition walls, and to the rafters of ceilings; they are placed slightly apart to receive the plaster, which, by being pressed into the intervals between the laths, is retained, and when dry is held securely on the wall.

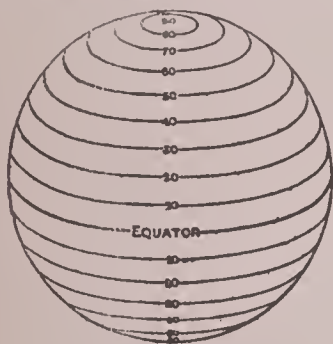
LATIMER, Hugh, D.D., an English prelate, reformer, and martyr, born about 1490. He was made chaplain to Henry VIII. in 1530, and during the ascendancy of Anne Boleyn in 1535 he was appointed bishop of Worcester. In 1538 he resigned his bishopric, not being able to accept the Six Articles, and was put in prison, but on the accession of Edward VI. he was released and became highly popular at court. This continued until Mary ascended the throne, when Latimer was cited to appear, along with Cranmer and Ridley, before a council at Oxford, and condemned. After much delay and a second trial, Latimer and Ridley were burned at the stake, Oct. 16, 1555. His preaching was popular in his own time for its pith, simplicity, and quaintness.

LATIN CHURCH, the Roman Catholic Church.

LATIN EMPIRE. See Byzantine Empire.

LATIN LANGUAGE AND LITERATURE. See Rome.

LATITUDE, in geography, the distance of any place on the globe north or south of the equator measured on its



Parallels of latitude.

meridian. It is called north or south according as the place is on the north or south of the equator. The highest or greatest latitude is 90°, that is, at the poles; the lowest or smallest 0°, at the equator, between which and the poles any number of parallel circles called parallels of latitude may be supposed to be drawn. One method of finding the latitude of a place is by measuring the altitude of the pole-star. When the latitude and longitude of a place are given its position on a map is easily found. See Longitude.

LATTICE-GIRDER, a girder of which the web consists of diagonal pieces arranged like lattice-work. Lattice-bridge is the name given when the cross-framing is made to resemble lattice-work.

LATTICE-LEAF, Lattice-plant, a very remarkable aquatic plant of Madagascar noteworthy for the structure of its leaves. The blade resembles lattice-work or open needle-work, the longitudinal ribs being crossed by tendrils, and the interstices between them open.

LAUD, William, Archbishop of Can-

terbury in the reign of Charles I., was born at Reading in Berkshire, 1573. After the accession of Charles I. Laud was translated to the see of Bath and Wells, and in 1628 to that of London, while his influence seemed to increase. In 1630 he was elected chancellor of the University of Oxford, which he enriched with a valuable collection of manuscripts, establishing also a professorship of Arabic. In 1633 he was promoted to the see of Canterbury. In



Lattice plant.

1634 he instituted rigorous proceedings against all who would not conform to the Church of England. By means of spies he hunted out the Puritans, and sought to extinguish all forms of dissent by means of fines, imprisonment, and exile. He prosecuted Prynne, Burton, and Bastwick for libel, and to him is attributed the severe sentences which they received. When the Long Parliament met (1640) the archbishop was impeached for high treason at the bar of the House of Lords by Denzil Holles and committed to the Tower. After three years he was brought to trial, but the lords deferred giving judgment. The House of Commons, however, passed a bill of attainder (January, 1644), declared him guilty of high treason, and condemned him to death. Accordingly he met his end on the scaffold at Tower Hill with great firmness. An edition of his works was published by Parker (Oxford, 1857-60).

LAUDANUM, tincture of opium. See Opium.

LAUGHING-GAS, nitrous oxide, or nitrogen monoxide, or protoxide of nitrogen; so called because, when inhaled, it usually produces exhilaration. See Nitrogen.

LAUGHING JACKASS, or **GIANT KINGFISHER**, a bird allied to the king-



Laughing Jackass.

fisher, deriving its former title from the singularly strange character of its cry. It is an inhabitant of Australia, being found chiefly in the southeastern portion of that country. It makes no nest

but deposits its eggs in the decayed hollow of a gum-tree. In length about 18 inches, it has a dark-brown crest, its back and upper surface is olive-brown, wings brown-black, and the breast and under portions white, crossed by faint bars of pale brown. The tail is longish, with a rounded extremity, tipped with white; its color is a rich chestnut, with deep black bars.

LAUGHTER, the outward expression of a certain emotion or excited condition of the nervous system, manifested chiefly in certain convulsive and partly involuntary actions of the muscles of respiration, by means of which the air, being expelled from the chest in a series of jerks, produces a succession of short abrupt sounds; certain movements of the muscles of the face, and often of other parts of the body also taking place. Laughter is generally excited by things which are of a ridiculous or ludicrous nature, the ultimate cause being usually attributed to the perception of some incongruity, though mere incongruity is not always sufficient. It may also be caused, especially in the young, by tickling; it also accompanies hysteria and sometimes extreme grief.

LAUNCH, the largest boat carried by a man of war; both steam and sail. Launches from 40 to 60 feet are carried and used for picket boats to guard against surprise by torpedo boats, by battle ships and large armored cruisers.

LAUNCHING, the process of removing a ship from the land to the water. The keel is laid upon a number of wooden blocks placed 6 or 7 feet apart and built up 3 or 4 feet from the ground, the tops of which slope downward to the water. When the ship is ready for launching, "ways" of timber and planking are laid down parallel to the keel, and at some little distance on each side of it, under the bilges of the ship; they extend into the water a considerable distance below high-water mark. A "cradle" is then built under the ship, of which the bottom is formed of smooth timbers resting upon the ways. Before launching, the under sides of these timbers and the upper sides of the ways are well greased, and the weight of the ship is transferred from the keel-blocks to the cradle and ways. Timbers, called "dog-shores," are placed so as to resist the tendency of the ship to slide down until the right moment, when the dog-shores are knocked away. Many large battle ships and some other vessels have been built in dry docks and floated out when ready, instead of being launched. This system is economical, if the dry docks are not needed for other purposes. On the Great Lakes the practice of launching ships sidewise is very common.

LAUREATE, Poet, a designation first applied to poets who were honored by the gift of a laurel wreath. It is now the name of an official connected with the royal household of Great Britain, the patent for which appears to have been granted by Charles I. 1630, although Ben Jonson and others are said to have held the title previously. It was the chief duty of the laureate to furnish an ode on the birthday of the king or upon the occasion of a national victory, the emolument attached to the office being

\$500 a year with a tierce of canary. Since the reign of George III. there have been no special duties connected with the office. From the time of Charles II. the following poets have in succession held the office of laureate:—John Dryden, Nahum Tate, Nicholas Rowe, Lawrence Eusden, Colley Cibber, William Whitehead, Thomas Warton, Henry James Pye, Robert Southey, William Wordsworth, Lord Tennyson, and Alfred Austin.

LAUREL, a plant belonging to the genus *Laurus*, nat. order Lauraceæ, to which it gives the name. The sweet-bay or laurel is a native of the north of Africa and south of Europe, and is cultivated in gardens not only on account of its elegant appearance, but also for the aromatic fragrance of its evergreen leaves. The fruit, which is of a purple color, and also the leaves, have long been used in medicine as stimulants and carminatives. The name is also given to other plants, as in America to the *Rhododendron maximum*. In ancient times heroes and scholars were crowned with wreaths of bay leaves, whence the terms laurels in sense of honors and laureate. From the fruit of the sweet-bay or laurel several oily substances have been extracted. Thus there is the oil of laurel, a yellowish oil with an odor of laurel and a strong bitter taste; laurel fat, a yellowish-green buttery substance, used for embrocations in rheumatism, paralysis, deafness, etc. The cherry-laurel also yields a volatile poisonous oil when its leaves are distilled in water. Notwithstanding this cherry-laurel leaves are often employed in cookery for their flavoring qualities. But caution requires to be exercised in their use, as death has resulted from an over-supply in custards, puddings, etc., and it is better to use bay leaves instead. From the cherry-laurel laurel-water is produced from the leaves by distillation. See Laurel-water.

LAUREL-WATER, a fluid obtained by maceration and distillation from the leaves of the cherry-laurel, being a watery solution of the volatile oil contained in the plant. It contains prussic acid and is therefore poisonous, but is used medicinally. See above article.

LAURENTIAN, in geology, a term applied to a vast series of stratified and crystalline rocks of gneiss, mica-schist, quartzite, serpentine, and limestone, about 40,000 feet in thickness, lying northward of the St. Lawrence in Canada. The Laurentian is the lowest fossiliferous system of rocks, if its characteristic and only fossil, the *Eozoon canadense*, can be ranked as a fossil. (See *Eozoon*.) The terms Archæan and Pre-Cambrian are used in Britain for rocks occupying a similar position to the Laurentian. See Geology.

LAURENTAIN MOUNTAINS, a range in Canada extending for over 3000 miles from Labrador to the Arctic Ocean, forming the watershed between Hudson's Bay, the St. Lawrence, and the great lakes, and dividing the same bay from the sources of the Mackenzie river. The average elevation is about 1500 feet, while some of the peaks attain a height of 4000 feet.

LAVA, the general term for all rock-

matter that flows, or has flowed, in a molten state from volcanoes, and which when cooled down forms varieties of tufa, trachyte, trachytic greenstone, and basalt, according to the varying proportions of felspar, hornblende, augite, etc., which enter into the composition of the mass, and according to the slowness or rapidity with which it has cooled. The more rapidly this process of cooling goes on the more compact is the rock.—Lava beds are of two kinds, namely, contemporaneous and intrusive. A contemporaneous lava bed is one which has been poured out over the surface of one deposit, and covered by subsequent deposits. Such a bed is in its natural position, and usually alters only the bed beneath it. Intrusive beds are those which have been forced up in a molten state through or between strata, altering those on both sides.

LA VALLIERE (vâl-yâr), Louise Françoise de la Baume le Blanc de, was born in Touraine in 1644, died 1710. The descendant of an ancient family, she was brought to court by her mother, became mistress to Louis XIV., and bore him four children. The king raised the estate of Vaujour into a duchy and a peerage in favor of her and her children. Superseded at court by Madame de Montespan she retired to a Carmelite convent in 1674, where she died.

LAVENDER, a delightfully fragrant shrub 3-4 feet high, a native of the south of Europe. Under favorable conditions it contains one-fourth of its own weight in camphor. It also produces a volatile oil, which is much in demand as an excellent perfume. This oil is got by distilling the flowers. It has a pale-yellow color, aromatic odor, and a hot taste. Besides being employed as a perfume, it is used in medicine as a stimulant in hysteria, colic, and other affections. Spirit of Lavender is prepared by digesting the fresh flowers in rectified spirits and distilling. Lavender-water is a solution of oil of lavender in spirit along with otto of roses, bergamot, musk, cloves, rosemary, etc. This preparation after standing for some time is strained and mixed with a certain proportion of distilled water. Enough oil is produced annually in England to make 30,000 gallons of lavender-water.

LAVOISIER (lâ-vwâ-si-â), Antoine Laurent, a celebrated French chemist, was born at Paris 1743. Conspicuous in all respects, when to be conspicuous was a crime, Lavoisier was accused before the convention as an ex-farmer-general and guillotined, 8th May, 1794. He was the first to organize the methods of chemistry and establish its terminology. His most important discoveries are to be found in his *Traité de Chimie* and *Mémoires de Physique et de Chimie*.

LAW. See Commercial Law, Canon Law, Civil Law, Common Law, International Law, etc.

LAW, John, of Lauriston, a celebrated financial projector, son of a goldsmith of Edinburgh, born 1671, died 1729. He was bred to no profession, but being skilled in accounts he made various proposals to the Scottish parliament to remedy the currency, which were rejected. Subsequently he fled from his

country in consequence of a duel; visited Genoa and Venice, where he accumulated a fortune by gambling; settled in France, where he received royal patronage and started a private bank, and floated his celebrated Mississippi company. His immediate success was so great that he was made a councillor of state and comptroller-general, but the large amount of paper-money issued depreciated the shares, and led to the collapse of his schemes. Having had to flee from France, he wandered about Europe as a gambler, and died at Venice in poverty. A volume entitled *Œuvres de J. Law* was published at Paris in 1790, 8vo.

LAWN TENNIS is a modified development of an old English game, and is played with rackets and india-rubber balls. The players number two, four, or more, forming even sides. The ground on which the game is played is usually 78 feet long by 30 feet broad. This space is divided by a net 24 feet wide, 5 feet high at the ends, and 4 feet in the center; the extreme ends of the area are called the base lines. The space on either side of the net thus marked off is called a court. This court has two lines running through it: one of which is called the central line, and runs lengthwise; the other is known as the service line, and runs parallel to, and 30 feet distant from, the central net. The ground thus divided is called the right and left courts. The mode of playing with two is, that one is called the server or "hand-in," while the other is "hand-out." When the ball is served by "hand-in" the server must stand with one foot outside the base line of the court, beginning on the right side, and his aim is to pitch the ball across the net and into the court diagonally opposed. If the server fails to do this it is called "a fault," and he must serve again. When the ball is properly served it is the opponent's duty to return it across the net before it touches the ground a second time. Should the ball not be returned, "hand-in" scores a point; on the contrary, should the ball not be properly served, "hand-out" scores. The player who first scores fifteen wins the game, but if both players are equal at fourteen the score is called "deuce." It is here that "vantage" is introduced, and in order to score game the player must win two successive points, otherwise the score returns to "deuce."

LAW OF NATIONS. See International Law.

LAWRENCE, a town in Essex co., Massachusetts, on both sides of the Merrimac river, 26 miles north from Boston. The principal buildings are the courthouse, state university, opera house, etc. It is principally supported by its extensive cotton and woolen factories, paper-mills, and manufactures of steam-engines, etc. Pop. 1909, about 76,000.

LAWRENCE, the capital of Douglas co., Kan.; on both sides of the Kansas river, and on the Atch., Top. and S. Fé, the Kan. City, Wyo. and N. W., and the Union Pac. railways; 38 miles w. of Kansas City. It is the seat of the State University and of Haskell Institute which, next to that at Carlisle, Pa., is

the largest Indian training-school in the United States. Pop. 12,100.

LAWRENCE, ST., one of the largest rivers in the world, which rises under the name of the St. Louis, and drains the great chain of North American lakes. In different parts of its course it is known by different names. From the sea to Lake Ontario it is called St. Lawrence; between Lakes Ontario and Erie it is called Niagara river; between Lakes Erie and St. Clair, Detroit river; between Lakes St. Clair and Huron, St. Clair's river; between Lakes Huron and Superior, St. Mary's river or the Narrows, forming thus an uninterrupted waterway of upward of 2000 miles. It receives the Ottawa, its principal auxiliary, at Montreal, as also the St. Maurice, the Saguenay, and numerous other large rivers from the north. The river is navigable for Atlantic steamers to the city of Montreal, 600 miles up, and from Montreal upward by river and lake steamers. The rapids between Montreal and Lake Ontario are passed by means of canals, and Niagara Falls by the Welland Canal. The river's breadth between Montreal and Quebec is from $\frac{1}{2}$ to 4 miles; the average breadth, about 2 miles. Below Quebec it gradually widens till it enters the Gulf of St. Lawrence. From the beginning of December to the middle of April the navigation is totally suspended by ice. In part of its course it forms the boundary between the United States and Canada.

LAWRENCE, ST., Gulf of, a large inlet of the North Atlantic in British North America, forming the continuation of the estuary of the river St. Lawrence, and separated from the Atlantic chiefly by the island of Newfoundland, Cape Breton, and Nova Scotia. It communicates with the ocean by the opening betwixt Newfoundland and Cape Breton, about 65 miles wide, by the Strait of Belle Isle and the Gut of Canso. It contains numerous islands, the principal of which are Anticosti, Prince Edward's, and the Magdalens.

LAWRENCE, JAMES, American naval officer, was born in Burlington, Vt., in 1781. He distinguished himself in the war with Tripoli. In 1808 he served as first lieutenant on the *Constitution* and then commanded successively the



Captain Lawrence.

Argus, the *Vixen* and the *Wasp*. In 1811 he was made captain of the *Hornet*, and in 1813 defeated the British brig-of-war *Peacock*. Congress gave him a gold medal as a reward for this victory, and he was also given command of the Chesapeake. On June 1, 1813, he attacked the British frigate *Shannon*

and a bloody engagement took place, the Chesapeake was captured and Lawrence mortally wounded. While being carried below he uttered the words, "Don't give up the ship," which soon became a motto in the navy.

LAWRENCE, John Laird Mair, Lord, Governor-general of India, born in Yorkshire 1811, died in London 1879. Educated at the college of Haileybury, he went to India, in 1829 where his rare administrative ability attracted attention, and caused him to receive the appointment of chief-commissioner of the Punjab in 1853, after he had served in minor posts. The entire wisdom of this appointment was demonstrated during the Indian Mutiny of 1857. By



John, Lord Lawrence.

the influence which he had gained over the Sikhs, Lawrence was able not only to keep the Punjab quiet, but to collect native forces and send them to assist in the early capture of Delhi. He was known as the savior of India, and his services were rewarded by his being made governor-general in 1863. On his return to England in 1868 he was raised to the peerage under the title of Baron Lawrence of the Punjab and of Grately.

LAWSON'S CYPRESS, a species of cypress found in the valleys of Northern California, where it grows to the height of 100 feet. The branches are numerous and are drooping, slender, and regularly disposed, forming a symmetrical columnar mass of rich green spray.

LAWTON, Henry Warc, American soldier, was born in Lucas co., Ohio, in 1843. He served in the civil war and rose to the rank of brevet-colonel. His operations against the Indians, against Geronimo especially, were successful. In the war with Spain he was commissioned brigadier-general; he was in command of the second division of the fifth corps in the operations against Santiago. After the fall of Santiago he was made major-general and given command of the department of Santiago. In 1898 he was sent to the Philippines as second in command under General Otis. He fell in battle at San Mateo, Luzon in 1899.

LAYARD, Sir Austin Henry, G.C.B., English traveler, archæologist, and diplomatist, was born in 1817. He was appointed attaché to the British embassy at Constantinople in 1849. In 1852 he entered parliament in the liberal interest; became under-secretary for foreign affairs in 1860, commissioner of

works in 1869, and ambassador to the Porte in 1877 under Lord Beaconsfield's government, when he accomplished the annexation of Cyprus. He wrote *Nineveh and its Remains*, *Discoveries in the Ruins of Nineveh and Babylon*, and *Early Adventures in Persia*, etc. He died in 1894.

LAY BROTHERS are an inferior class of monksemployed asservants in monasteries. Though not in holy orders they are bound by the three monastic vows of poverty, chastity, and obedience. They wear a dress somewhat different from that of the other monks. In nunneries a similar distinction prevails between the nuns proper and the lay sisters.

LAYERING, in gardening, the propagation of plants by bending the shoot of a living stem into the soil, the shoot striking root while being fed by the parent plant. The figure shows the



Layering.

branch to be layered bent down and kept in the ground by a hooked peg, the young rootlets, and a stick supporting the extremity of the shoot in an upright position.

LAY-FIGURE, a jointed human figure used by painters, made of wood or cork, which can be placed in any attitude, and serves when clothed as a model for draperies, etc.

LEAD, a metal of a bluish-gray color; when recently cut it has a strong metallic luster, but soon tarnishes by exposure to the air owing to the formation of a coating of carbonate of lead. It is soft, flexible, and inelastic. It is both malleable and ductile, possessing the former quality to a considerable extent, but in tenacity it is inferior to all ductile metals. It fuses at about 612°, and when slowly cooled forms octohedral crystals. It is an abundant and widely distributed metal. It is a constituent of a very large number of minerals, all of which could be used as sources of it if they could be obtained in sufficient quantity. In practice the metal is got from only a few of these minerals, especially from the sulphide, carbonate, and one or two others. The most important of all the ores of lead is the sulphide or lead glance, which has been described under the term *galena*. The carbonate, also called *cerusite*, or *lead spar*, like all the salts of lead, is perfectly unmetallic in its appearance, and is not unfrequently rejected from among common lead ore as an earthy mineral. It occurs in veins in primitive and secondary rocks, accompanying *galena*, and other ores of lead. It is abundant in European countries, in Britain, in Ireland, and it has been found at different localities in the United States. The sulphate of lead, *anglesite*, or *lead vitrol*, was found originally at Anglesey. Chromate of lead, *crocoisite*, or *crocoite* was originally found in Siberia; it has since been met with in the Philippine Islands,

LEAD

in Brazil, and in Hungary. It was in this mineral that chromium was first discovered. Phosphate of lead is found accompanying the common ores of lead, though rarely in any considerable quantity. Finely crystallized varieties are found at Leadhills in Scotland, and in Cornwall. In the ores of lead silver is a very common constituent. Of the salts formed by the action of acids on lead or on the protoxide, the carbonate or white-lead and the acetate or sugar of lead are the most important. The protoxide is also employed for glazing earthenware and porcelain. Carbonate of lead is the basis of white oil-paint and a number of other colors. The salts of lead are poisonous, but the carbonate is by far the most virulent poison. Lead is one of the most easily reducible metals, and from the native carbonate can be got by simply heating with coal or charcoal. The sulphide, however, which is the most abundant of its ores, is not so readily acted on by coal, and a reverberatory furnace, or a special variety of blast-furnace, is employed. Lead obtained in this way is usually too hard for use, and it has to be subjected to a process of purification. This is effected by roasting the lead, sometimes for several weeks, in a reverberatory furnace. By this process the antimony, which is the chief impurity, is burned off, and the dross, which consists of the oxide, of that metal with oxide of lead, is afterward reduced and utilized as a source of antimony. The lead, when judged sufficiently pure, is then cast into ingots or pigs of lead. Prepared in this way the lead retains all the silver present in the original ore, and as that is always of value it used to be extracted whenever the quantity of silver present amounted to above 10 oz. per ton. 1 part of tin and 2 of lead form an alloy fusible at 350° Fahr., which is used by tinmen under the name of soft solder. Lead also forms an imperfect alloy with copper. With antimony lead forms the important alloy called type-metal. Pewter is a hard alloy of four parts of tin and 1 of lead. In these proportions the lead is not attacked by organic acids such as the acetic. For the poisonous effects of lead see Lead-poisoning.

LEAD, an instrument used on ship-board for discovering the depth of water. It is composed of a large piece of lead shaped like an elongated clock-weight, from 7 to 11 lbs. in weight, and is attached to a line, generally of 20 fathoms length, called the lead-line, which is marked at certain distances to ascertain the depth in fathoms. When the depth is great the deep-sea lead, weighing from 25 to 30 lbs., is used. The line, which is much longer than the former, and called the deep-sea line, is marked by knots every 10 fathoms, and by a smaller knot every 5.

LEAD-POISONING, a disease caused by the presence of lead in some quantity in the system. It may be due to lead which has been taken up by water or other beverage from lead pipes or vessels in which it has been contained. The use of lead in the arts is also a frequent cause of painful, and sometimes of fatal effects, from the metal finding its way into the system. The glazing of culinary

vessels with lead; the coloring of confectionary with the chromate, chloride, or carbonate of lead; the sweetening of sour wine by litharge or oxide of lead, may all produce lead-poisoning more or less serious. But the most frequent and virulent cases occur among painters and persons engaged in white-lead factories; and four forms of disease, either simple or complicated, are apt to manifest themselves—1, Lead or painters' colic, or dry belly-ache; 2, Lead rheumatism or arthralgia; 3, Lead palsy or paralysis, more particularly of the muscles of the fore-arm; and 4, Disease of the brain, manifested by delirium, coma, or convulsions—a form, however, of rare occurrence. Opium and cathartics are the chief medicines administered.

LEADVILLE, the capital of Lake co., Colorado, 130 miles w.s.w. of Denver, situated on a plateau over 10,000 feet above sea-level. The city owes its origin to the rich argentiferous lead and silver mines in the neighborhood. The mineral output of Leadville exceeds \$200,000,000. Pop. 13,700.

LEADWORT, a name for the plants typical of the order Plumbaginaceæ.

LEAF, the green deciduous part of a plant, usually shooting from the sides of the stem and branches, but sometimes from the root, by which the sap is supposed to be elaborated or fitted for the nourishment of the plant by being exposed to air and light on its extensive surface. When fully developed the leaf generally consists of two parts, an expanded part, called the blade or limb, and a stalk supporting that part, called the petiole or leaf-stalk. Frequently, however, the petiole is wanting, in which case the leaf is said to be sessile. Leaves are produced by an expansion of the bark at a node of the stem, and generally consist of vascular tissue in the veins or ribs, with cellular tissue or parenchyma filling up the interstices, and an epidermis over all. Some leaves, however, as those of the mosses, are entirely cellular. See Botany.

LEAGUE, a measure of length varying in different countries. The English land league is 3 statute miles, and the nautical league 3 equatorial miles, or 3.457875 statute miles. The French metric league is reckoned as equal to 4 kilomètres or 4374 yards.

LEANING TOWER, a tower which overhangs its base on one side. The most celebrated example is the Campanile of Pisa, which has an obliquity of 13 feet in a height of 179. It is built in the Romanesque style, to correspond with the cathedral, and is surrounded by open arcades of columns. Other well-known examples are in Bologna, the Torre Asonelli, and the Torre Garisenda, both built of brick, the latter well known through a passage in Dante's *Inferno*. It is a disputed question as to whether the slant of these towers is accidental. That of Pisa shows an increased height in each successive story on the leaning side which has been attributed by some to attempts of the architects to rectify a sinking while the tower was being built. Others have advanced arguments to show that the slant here and elsewhere

LEATHER

was intentional. The latter is the prevailing opinion.

LEAP-YEAR, one of the years which contain 366 days, being every fourth year, which leaps over a day more than a common year. Thus in common years, if the first day of March is on Monday the present year, it will the next year fall on Tuesday, but in leap-year it will leap to Wednesday, for leap-year contains a day more than a common year, a day being added to the month of February. Every year is a leap-year which is divisible by 4 without remainder, except the concluding years of centuries, every fourth only of which is a leap-year; thus the years 1800 and 1900 are not leap-years, but 2000 and 2400 are.

LEAR, Edward, English artist and poet, born at Holloway, in London, in 1812. Among his best known and popular works are: *Book of Nonsense*, *Nonsense Songs*, *More Nonsense Songs*, *Laughing Lyrics*. He died in 1888.

LEANDER. See Hero.

LEA'OTONG, or **SHING-KING**, a Chinese prov. in Manchuria (but now reckoned as part of China proper), stretching into the Yellow Sea between the gulfs of Leaotong and Corea. It has an area of 37,000 sq. miles, a pleasant climate, and is generally fertile. Pop. 6,000,000.

LEASE, a permission to occupy lands or tenements for life or a certain number of years, or during the pleasure of the parties making the contract. The party letting the lands or tenements is called the lessor, the party to whom they are let the lessee, and the compensation or consideration for the lease the rent. A lease for a period not exceeding three years may be by verbal contract. If, however, the term be longer than three years, the lease must be by deed. A breach of any of the covenants contained in a lease was formerly sufficient to render it void, but now any breach may be compensated by a money payment. The power to lease necessarily depends upon the extent of the lessor's estate in the land or tenement to be leased. A proprietor who has only a life-estate can of course lease his property only during his life.

LEATHER, the skins of animals dressed and prepared for use by tanning, tawing, or other processes, which preserve them from putrefaction and render them pliable and tough. The skins employed are chiefly those of cattle, though the skins of horses, asses, sheep, pigs, and goats are also converted into leather. Before subjection to the process of tanning, the cured hides require to be brought back as far as possible to the condition of fresh hides by soaking and softening in water, to which sometimes salt or carbolic acid or sulphide of sodium is added. The softening is now generally assisted by machines, which subject the skins to a kneading process. They are then unhaired by the agency of lime, the customary method of liming being to spread out the hides flat in milk of lime in large pits, the hides being "hauled" or drawn out once or twice a day, and the liquor stirred up; but there are several variations upon this method of liming. In America and on the European continent the hair is loosened by

"sweating," which induces a partial putrefaction, attacking the root-sheaths without injuring the hide substance proper. In the old method of warm sweating, the hides were simply laid in a pile and covered, if necessary, with fermenting tan; the preferable cold method consists in hanging the hides in a moist chamber at a uniform temperature of 60° or 70° F. When the hair is sufficiently loosened the hides are usually thrown into the "stocks," where the slime and most of the hair is worked out of them. Other unhairing processes consist in treatment with alkaline sulphides, especially sulphide of sodium or sulphide of arsenic. To remove the loosened hair, the hide is generally thrown over a beam and scraped with a blunt two-handled knife, but several unhairing machines have been invented. After unhairing, the loose flesh and fat are scraped, brushed, or pared from the inner side, and the hides intended for sole leather are rounded or separated into "butts" and "offal"—the latter the thinner parts, including the cheeks, shanks, and belly pieces. The butts are then suspended for from twelve to twenty-four hours in soft fresh-water, and frequently shaken in it to remove lime or dirt prior to undergoing the process of tanning (see Tanning) and currying (see Currying). The brilliant smooth surface of patent, enameled, lacquered, varnished, or japanned leather is due to the mode of finishing by stretching the tanned hides on wooden frames and applying successive coats of varnish, each coat being dried and rubbed smooth with pumice-stone. Other special kinds of leather are seal leather, Russia and Morocco leathers (which see). Tawed leathers (see Tawing) consist chiefly of the skins of sheep, lambs, kids, and goats treated with alum, or some of the simple aluminous salts, the principal tawing industries being the manufacture of calf-kid for boots and glove-kid. Shamoy, or oil-leather, is prepared by impregnating hides and skins with oil (see Shamoy). The chief markets for leather in Britain are at London, Leeds, and Bristol. Important European centers are Antwerp, Havre, Paris, Marseilles, Vienna, and Berlin; while in the United States, New York, Chicago, Boston, and Philadelphia are the chief centers.

LEATHER, Artificial, the general name of certain fabrics possessing some of the qualities, and often the appearance of leather. One of the earliest methods of fabrication consisted in applying oily pigments to cloth which was subsequently rolled and coated with a sort of enamel paint. An article of this sort, known under the name of leather-cloth, was first produced in America about 1849. Another kind consists of leather parings and shavings reduced to a pulp, and then moulded into buckets, machinery-bands, picture-frames, and other useful and ornamental objects. A so-called vegetable leather consists of caoutchouc dissolved in naphtha, spread upon a backing of linen. It is of considerable strength and durability, and is used for table-covers, carriage-aprons, soldiers' belts, harness, book-binding, etc. Various other substitutes for leather have been recently intro-

duced, one consisting of cloth with a thin facing of leather; but the commonest material is still obtained by varnishing textiles with coatings of some resinous substance, and then painting or embossing them.

LEAVEN, dough in which fermentation has commenced, employed to ferment and render light the fresh dough with which it is mingled. Its use dates from remotest antiquity; the addition of yeast or barm being of modern date.

LEAVENWORTH (lěv'en-wurth), the county-seat of Leavenworth co., Kan., 26 miles northwest of Kansas City. There are coal-mining interests and extensive manufactures, including vitrified and building brick, stoves, furniture, machinery, flour, wagons, etc. In the suburbs are the United States and state penitentiaries, a home for disabled volunteers and Fort Leavenworth, one of the most important military posts of the West. Pop. 22,135.

LEB'ANON, a town in Lebanon co., Pennsylvania. It is a seat of iron and other industries. Pop. 19,160.

LEB'ANON, Mountains of, two nearly parallel mountain ranges in the north of Palestine, stretching from southwest to northeast, and inclosing between them a valley about 70 miles long by 15 miles wide. In the south part of the chain the Upper Jordan has its source. The habitable districts are occupied toward the north by the Maronite Christians, and toward the south by the Druses. The forests of cedar for which Lebanon was famed have to a large extent disappeared.

LECKY, Will. Ed. Hartpole, English historical writer, born in Dublin 1838. He has written *The Leaders of Public Opinion in Ireland*; *History of the Rise and Influence of the Spirit of Rationalism in Europe*; *History of European Morals from Augustus to Charlemagne*; *History of England in the Eighteenth Century*. He died in 1903.

LEE, in nautical language, refers to the side toward which the wind is blowing, leeward and windward being opposite terms. A lee shore is one to leeward of a vessel.—A vessel's leeway is the amount that she drifts from her proper course.

LEE, Ann, founder of the Shaker sect; was born in Manchester, England, in 1736. In 1758 she joined the Manchester Society of Friends, and preached against lustful gratification. In 1770 she was imprisoned for creating religious disturbance among the lower orders, after her release was deemed by many their spiritual mother in Christ. She then claimed to have had direct revelation from Christ, declared the wrath of the Almighty against marriage, and was eventually incarcerated in a mad-house. Thereafter she declared she had a special revelation to go to the United States, and, with a number of her followers, arrived in New York City in May, 1774. After some vicissitudes she founded a settlement at Watervliet, near Albany, N. Y. Here she was accused of witchcraft, and later, on a charge of high treason, was arrested and imprisoned in Albany during the summer of 1776. In 1780 her society began to increase, and during a religious revival at New

Lebanon many persons united with her followers. In 1781, in company with several of her elders, she visited the New England states, preaching at many places, and founded a new society at Harvard, Mass. She died in 1784.

LEE, Arthur, one of the American representatives in Europe during the revolutionary war. He was born in Stratford, Westmoreland co., Va., in 1740. Upon Franklin's return to America early in 1775, Lee succeeded him as the agent of Massachusetts, and he was appointed by the committee of secret correspondence of the continental congress as its secret agent in London. He was one of the negotiators of the treaties concluded with France in February, 1778. In 1781 Prince William County sent him to the Virginia legislature, by which body, at the close of the year, he was sent to the continental congress, where he remained until 1785. On the establishment of the new national government he retired finally to private life, and died after a brief illness December 12, 1792.

LEE, Charles, soldier, was born in Dernhall, England, in 1731. In 1754 his regiment was ordered to America to take part in Braddock's western expedition. Lee served in later campaigns as captain of grenadiers, and was present at several conferences of Sir William Johnson with the Indians. His relations with the Mohawks became so friendly that he was adopted as one of their tribe. In 1775 congress appointed him second major-general in the continental army. In July, 1775, Lee joined the army at Cambridge, and was placed in command of the left wing. On October 14th Lee arrived in New York City and took command of the right wing of Washington's army, on Harlem Heights. While separated from his forces, on December 13th, General Lee was surprised and captured by a party of dragoons. In May, 1778, he was exchanged for General Prescott, and joined the American army at Valley Forge. On June 28th Lee overtook the enemy, who were retreating from Philadelphia to New York, at Monmouth, N. J. When Washington arrived for his support, he was astonished to find his division in disorderly retreat, pursued by the British. It was then the commander-in-chief lost his temper, and in round terms swore at Lee in the hearing of his soldiers. Rallying his forces, he soon repelled the enemy and sent Lee to the rear. Afterward Lee was tried for insubordination, and ordered to be suspended from command for a year. For his disrespect to Washington, he was challenged by Col. John Laurens, Washington's aide-de-camp, and in the subsequent duel was shot in the arm. Thereafter he wrote an offensive letter to congress, for which he was dismissed from the army. He retired to his estate in the Shenandoah Valley. He died in 1782.

LEE, Fitzhugh, American soldier, nephew of Robert E. Lee. He was born in Clermont, Va., in 1835. He entered the confederate army, and was adjutant-general in General Ewell's brigade. He served as colonel of a cavalry regiment in nearly all the important operations of the army of northern Virginia; was

appointed brigadier-general in 1862, and major-general in 1863; was severely wounded at Winchester, Va., 1864; and from March, 1865, until his surrender to General Meade at Farmville, was in command of all the cavalry of the army of northern Virginia. From 1886 to 1890 he was Governor of Virginia. He was appointed collector of internal revenue for the western district of Virginia in 1895, and in 1896 was sent to Cuba by President Cleveland as consul-general at Havana. In 1898 he was appointed major-general of volunteers and placed in command of the seventh army corps. In January, 1899, he became military governor of Havana, and subsequently was placed in command of the department of Missouri. He died in 1905.

LEE, Francis Lightfoot, was born in Westmoreland co., Va., in 1734. After serving in the Virginia house of burgesses from London and Richmond counties, he was, in August, 1775, elected to the continental congress, in which he served until 1779. He signed the Declaration of Independence, and assisted in drawing up the articles of confederation. He died in 1797.

LEE, George W. C., eldest son of General Robert E. Lee, was born at Arlington, Va., in 1832. He rose to a major-general's commission, and commanded a division of the army of northern Virginia. In February, 1871, he succeeded his father as president of Washington College, Va., (now Washington and Lee University).

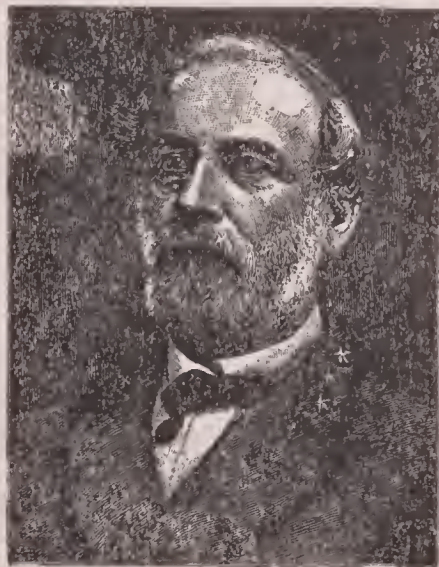
LEE, Henry, an American revolutionary general, born in Westmoreland co., Virginia, 1756; educated at Princeton College, and in 1776 appointed captain of a company of cavalry in Colonel Bland's Virginia regiment. In the memorable retreat of Greene before Lord Cornwallis, Lee's legion acquired fame as the rear-guard of the American army, the post of the greatest danger. At the battles of Guildford courthouse and Eutaw, and in other affairs, Lee specially distinguished himself. On the conclusion of the war he was sent to congress as a delegate from Virginia, and in 1792 was chosen governor of that state. In 1801 he retired from public life. He died in 1816.

LEE, John Doyle, Mormon official, born at Kaskaskia, Ill., in 1812. In 1837 he came under Mormon influence and moved to Davies co., Mo., where he joined the church. He was accused of having incited the massacre of the Arkansas emigrants at Mountain Meadows in 1857. On his first trial before the United States court in 1875 the jury disagreed, but on the second trial in 1876 he was found guilty. He was shot on the scene of the outrage, March 23, 1877. After his second trial he declared that he had acted under instructions from Brigham Young and other high Mormon officials, who had made him the scape-goat.

LEE, Richard Henry, a distinguished American, born 1732 at Stratford, Westmoreland co., Virginia. He received part of his education in England, and after his return to his native country was chosen a delegate to the house of Burgesses from Westmoreland county. In the opposition to unjust British

claims he played throughout a most important part, and on being sent as delegate from Virginia to the first American congress at Philadelphia (1774) was at once recognized as a leader in that assembly. He drew up most of those addresses to the king and the English people which were admitted by his political opponents to be unsurpassed by any of the state papers of the time. When war became inevitable Lee was placed on the various committees appointed to organize resistance. On the 7th of June, 1776, he introduced the motion finally breaking political connection with Britain. In 1784 he was unanimously elected president of the congress, and when the federal constitution was established he entered the senate for his native state. In 1792 he retired into private life, and died in Virginia in 1794.

LEE, Robert Edmund, American general, commander-in-chief of the confederate army, and one of the most skillful tacticians who took part in the great civil war, was born in Virginia in 1808. In 1829 he left the military academy of West Point with the rank of second lieutenant of engineers. After making a tour in Europe he obtained a captaincy in 1838, and in 1847 was appointed



Robert E. Lee.

engineer-in-chief of the army for the Mexican campaign, in which his brilliant services at Cerro-Gordo, Contreras, Cherubusco, and Chapultepec (where he was wounded) speedily gained for him the rank of colonel. From 1852 to 1855 he was superintendent of military studies at West Point. In 1861 he became colonel of his regiment, but on the secession of Virginia from the union he threw up his commission, was intrusted with the command of the Virginia army, and subsequently was selected by President Davis as commander-in-chief. In June, 1862, he defeated the federal army under McClellan, and, aided by Stonewall Jackson, defeated Pope in a series of engagements commencing 20th August, and ending with the victory of Manassas Junction on the 30th. Lee now crossed the Potomac into Maryland to threaten Washington itself, but a series of checks obliged him to

withdraw behind the Rappahannock. On the 13th December he routed the federalists under Burnside at Fredericksburg, and on the 2d and 3d May, 1863, gained the splendid victory of Chancellorsville over Hooker. After this Lee resolved to push on to Washington, but was beaten by Meade at Gettysburg, July 1st and 3d, and forced to retreat into Virginia. In the autumn of that year he collected all his forces, defeated Meade on Nov. 7, and in May, 1864, advanced upon Fredericksburg, while Grant at the head of a large army entered Virginia. A series of sanguinary engagements took place at Spottsylvania (5th to 10th May), in which Lee was worsted, but on June 3d he defeated Grant at Chickahominy. The federals, however, with their great superiority of men and material, gradually hemmed in the confederate forces, and on April 9th Lee and his army surrendered to Grant at Burkesville. General Lee then retired into private life, was elected president of Washington College, Lexington, Virginia, in 1865, where he died on the 12th October, 1870.

LEE, William Henry Fitzhugh, second son of Robert E. Lee, was born at Arlington, Va., in 1837. He was appointed lieutenant in 1857 and served in the Utah campaign. In 1861 he joined the confederate forces, became a brigadier-general in October, 1862, was captured and exchanged, and in April, 1864, was promoted major-general of cavalry and led his division from the Rapidan to Appomattox. In 1886 he was elected to congress and re-elected in 1888 as a democrat. He died in 1906.

LEECH, a name for those worms, the distinctive feature of which consists in the presence of one or two sucking-discs. The rings of the body are very numerous and closely set. Usually leeches breathe either by the general surface of the body or by little sac-like pouches known as the respiratory sacculi. They chiefly inhabit fresh-water ponds, though some live among moist grass, and some are marine. The familiar horse-leeches of fresh-water ponds and ditches are included in this group. The land-leeches of Ceylon are terrestrial in habits, living among damp foliage, and in like situations. They fasten on man and beast, and are a serious pest to travelers. The species generally employed for medical purposes belong to the genus *Sanguisuga* and are usually either the Hungarian or green leech, used in the south of Europe, or the brown-speckled or English leech, used in the north of Europe. The latter variety, however, is now rare in England, owing to the drainage of bogs and ponds. The mouth, situated in the middle of the anterior sucker, is provided with three small white teeth, serrated along the edges, and capable of inflicting a peculiar Y-shaped wound, which, like that produced by the soldier's bayonet, is difficult to close, and permits a large and continuous flow of blood. From 4 drachms to 1 oz. may be stated to be the average quantity of blood that can be drawn by a leech. After detaching themselves, leeches are made to disgorge the blood they have drawn by being placed in a weak solution of salt, or by having a little salt

sprinkled over them. Leeches appear to hibernate in winter, burying themselves in the mud at the bottom of the pools, and coming forth in the spring.

LEECH, the border or edge of a sail which is sloping or perpendicular.

LEEDS, a municipal, parliamentary, and county borough and manufacturing town of England, in the West Riding of Yorkshire, on the river Aire, which here becomes navigable, and is crossed by eight bridges; 185½ miles by railway n.n.w. from London. The Leeds and Liverpool Canal communicates with the Aire, which again gives water communication with Hull, etc. The town extends for about 7½ miles from east to west, and about 7 from north to south. Leeds has been for generations the chief seat of the woolen manufacture of Yorkshire. The other chief industries are: boot and shoe factories, the leather trade, color-printing works, tobacco manufactories, chemical and glass works, works for making drainage pipes, fire-bricks, terra-cotta, pottery, etc. Nearly a hundred collieries are worked in the district. Pop. 428,953.

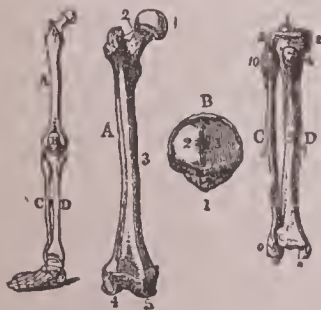
LEEK, a mild kind of onion much cultivated for culinary purposes. The stem is rather tall, and the flowers are disposed in large compact balls, supported on purple peduncles.

LEEUWENHOECK (lā'ū-ven-hōk), Antony van, Dutch microscopist, born 1632, died 1723. He completed Harvey's discovery of the circulation of the blood by showing that it passes from the arteries to the veins through the capillaries. He also discovered the red corpuscles of the blood, the spermatozoa, the infusorial animalcules, etc. He contributed papers to the Philosophical Transactions of the Royal Society, London.

LEEWARD, in nautical phraseology, a term that refers to the quarter toward which the wind blows. See Lee.

LEEWARD ISLANDS. See West Indies.

LEG, any limb of an animal that is used in supporting the body, and in



Bones of the human leg.

A, femur: 1, Head; 2, Neck; 3, Shaft; 4, External condyle; 5 Internal do. B, Patella: 1, Apex of the bone; 2, Surface of articulation with external condyle of the femur; 3, Do. with internal condyle. C, Fibula: 6, Shaft; 9, Lower extremity, the external malleolus; 10, Upper extremity. D, Tibia: 1, Spinous process; 2, Inner tuberosity; 3, Outer do; 4, Tubercle; 5, Shaft; 7, Internal surface of shaft; the sharp border between 5 and 7 the crest of tibia; 8, Internal malleolus.

walking and running; in a narrower sense that part of the human limb from the knee to the foot. The human leg has two bones, the inner called the tibia or shin-bone, the outer called the fibula or clasp-bone. The tibia is much the larger

of the two, and above is connected with the thigh-bone to form the knee-joint, the fibula being attached to the outer side of its head. In front of the knee-joint, situated within a tendon, is the knee-cap or patella. (See Knee.) The lower-end of the tibia and of the fibula enter into the ankle-joint, the weight being conducted to the foot by the tibia. (See Foot.) In the foreleg are muscles which extend the foot, and on the back of the leg are two large muscles which form the bulk of the calf of the leg, and which unite in a thick tendon, the tendo Achillis. These muscles are used in walking, jumping, etc.

LEG'ACY, a gift of personal property by will. It is a general rule that if a legatee die in the lifetime of the testator, the legacy lapses and falls into the residue of the estate, unless when the legatee has been a child of the testator, and has left children. All legacies are postponed to the claims of creditors.

LE'GATES, persons sent by the pope as ambassadors to foreign courts. Legate a latere, the highest in rank, were sent on particularly important missions, and were taken from the college of cardinals only.

LEGATION, the body of official persons attached to an embassy. Formerly in Italy legation signified a division of the states of the church.

LEGA'TO, in music, a word used in opposition to staccato, and implying that the notes of the movement, or passage to which it is affixed, are to be performed in a close, smooth, and gliding manner, each note being held till the next note is struck.

LE'GEND, originally the title of a book containing the lessons that were to be read daily in the service of the early church. The term legend was afterward applied to collections of biographies of saints and martyrs, or of remarkable stories relating to them, because they were read at matins and in the refectories of cloisters, and were earnestly recommended to the perusal of the laity. The Roman breviaries contain histories of the lives of saints and martyrs, which were read on the days of the saints whom they commemorated. They originated in the 12th or 13th century, and they contributed much to the extinction of the old German (heathen) heroic traditions. The term is used in a general sense for any remarkable story handed down from early times, and is also applied to the motto or words engraved in a circular manner round the head or other figure upon a medal or coin.

LEGERDEMAIN (lej-ér-de-mān'), or **CONJURING**, a popular amusement or exhibition, consisting of tricks performed with such art and adroitness that the manner or art eludes observation. All the phenomena of legerdemain are referable to sleight of hand, mechanical contrivances, confederacy, or some combination of these. In the more elaborate phases of the art the aid of optical, chemical, and other sciences is utilized.

LEGHORN, a seaport of Northern Italy, in the province of Leghorn or Livorno, on the Mediterranean, 12 miles s.s.w. of Pisa and 50 miles w.s.w. of Florence. Pop. 96,937.

LEGHORN, a kind of plait for bonnets

and hats made from the straw of bearded wheat cut green and bleached; so named from being imported from Leghorn.

LEGION, in ancient Roman armies a body of infantry consisting of different numbers of men at different periods, from 3000 to above 6000, often with a complement of cavalry. Each legion was divided into ten cohorts, each cohort into three maniples, and each manipule into two centuries. Every legion had sixty centurions, and the same number of options or lieutenants and standard-bearers. The standard of the legion was an eagle.

LEGION OF HONOR, a French order for the recognition of military and civil merit, instituted by Napoleon while consul, May 19, 1802, and inaugurated 14th July, 1804. The decoration originally consisted of a star containing the portrait of Napoleon surrounded by a wreath of oak and laurel, with the legend, "Napoléon empereur des Français;" on the reverse was the French eagle with a thunderbolt in his talons, and the legend, "Honneur et patrie." The order has been remodeled several times, the last occasion being subsequent to the downfall of the second empire. There are now five ranks or classes: ordinary chevaliers or knights, officers, commanders, grand-officers, grand-crosses. The profuse granting of the decoration of the order latterly brought the institution into discredit, and the number of chevaliers is now restricted to 25,000, the officers to 4000, the commanders to 1000, the grand-officers to 200, and the grand-crosses to 70. The star now bears a figure emblematic of the republic, with the inscription "République Française, 1870," on the reverse two flags, with the inscription "Honneur et Patrie."

LEGUMINO'SÆ, one of the largest and most important natural orders of plants, including about seven thousand species, which are dispersed throughout the world. They are trees, shrubs, or herbs, differing widely in habit, with stipulate, alternate (rarely opposite), pinnate, digitately compound or simple leaves, and axillary or terminal one or many flowered peduncles of often showy flowers, which are succeeded by a leguminous fruit. Four sub-orders are recognized: Papilionaceæ, Swartzicæ, Cæsalpinieæ, and Mimoseæ. It contains a great variety of useful and beautiful species, as peas, beans, lentils, clover, lucern, sainfoin, vetches, indigo, logwood, and many other dyeing plants, acacias, senna, tamarinds, etc.

LEHIGH RIVER, a river of the United States, in Pennsylvania, rising in Pike county and joining the Delaware at Easton after a course of 100 miles, of which 70 are navigable.

LEHIGH UNIVERSITY, an institution of the United States, at South Bethlehem, Pa., founded and liberally endowed by Asa Packer for the instruction (without charge) of young men from any part of the country or of the world. It has fine buildings, a library of over 50,000 vols., etc. It gives instruction in the various branches of general literature and technology.

LEIBNITZ (lib'nits), Gottfried Wilhelm, Baron von, German scholar and

philosopher, born in 1646 at Leipzig. He studied law, mathematics, and philosophy at the university of his native town, where he published a philosophical dissertation, *De Principio Individui*, as early as 1663. This was followed by several legal treatises, for example *De Conditionibus* (1665), and by a remarkable philosophico-mathematical treatise, *De Arte Combinatoria* (1666). After holding political appointments under the elector of Mainz he went to Paris in 1672, and there applied himself particularly to mathematics. He also



Leguminosæ.

1, Papilionaceæ: a, Flower of the pea; s, Standard; w, Wings; k, Keel; b, Stamina, nine connected, one free; c, Legume, seeds fixed to the upper suture in one row. 2, Swartzia: a, Flower of *Swartzia grandiflora*, with its single petal and hypogynous stamens; b, Calyx; c, Legume. 3, Cæsalpinieæ: a, Flower of *Poinciana pulcherrima* showing its difform interior upper petal; b, Calyx; c, Legume. 4, Mimoseæ: a, One flower of common sensitive plant (*Mimosa pudica*) showing its regular corolla; b, Stamina, hypogynous; c, Legume exterior; d, Legume interior; e, Legume of *Acacia arabica*. A, Curved radicle, as in Papilionaceæ. B, Straight radicle, as in Swartzia and Cæsalpinieæ.

went to England, where he was elected a member of the Royal Society, and made the acquaintance of Boyle and Newton. About this time he made his discovery of the differential calculus. Having assisted the elector of Brandenburg (afterward Frederick I. of Prussia) to establish the Royal Academy of Sciences at Berlin, he was made president for life (1700). He was also made a privy-councillor by the Czar Peter the Great. In 1710 he published his celebrated *Essai de Théodicée*, on the goodness of God, human liberty, and the origin of evil, in which he maintained the doctrines of pre-established harmony and optimism, and which was followed by his *Nouveaux Essais sur l'Entendement Humain*. A sketch of his philosophy was given by him in his *Monadologie*, 1714. His controversy with Newton concerning the discovery of the differential calculus, and the pains of the gout, embittered the close of his active life. He died in 1716. The principal metaphysical speculations of Leibnitz are contained in his *Théodicée*, *Nouveaux Essais*, *Système nouveau de*

la Nature, *De Ipsa Natura Monadologie*, and in portions of his correspondence. He controverted Locke's rejection of innate ideas, holding that there are necessary truths which cannot be learned from experience, but are innate in the soul, not, indeed, actually forming objects of knowledge, but capable of being called forth by circumstances. Authorities seem generally agreed that Leibnitz discovered the differential calculus independently of any knowledge of Newton's method of fluxions, so that each of these great men in reality attained the same result for himself.

LEIDY, Joseph, American naturalist, was born in Philadelphia in 1823. He held chairs of anatomy in several Pennsylvania colleges; was an army surgeon during the civil war, and, in 1871, became professor of natural history in Swarthmore College. He was a member of numerous scientific societies, including the National Academy of Sciences, and was president of the Philadelphia Academy of Natural Sciences. Harvard made him LL.D. in 1886. He has written many hundred papers on biology and kindred subjects. He died in 1891.

LEICESTER, (les'tér) a municipal, parl., and county borough of England, county town and near the center of Leicestershire, on the right bank of the Soar. The staple manufactures are cotton and worsted hosiery, elastic webs, ironware, boots and shoes, shawls, lace, thread, etc. Pop. 211,574.—Leicestershire is bounded by Notts, Derby, Warwick, Northampton, Rutland, and Lincoln; area, 511,907 acres, almost all arable land, meadow, and pasture. Dairy farms are numerous, and the cheese known as Stilton is chiefly made in Leicestershire. Pop. 433,994.

LEICESTER, Robert Dudley, Earl of, fifth son of John Dudley, Duke of Northumberland, born 1532, died 1588. In 1549 he was married to Amy Robsart, daughter of a Devonshire gentleman, and is said to have been accessory to her murder in 1560. Elizabeth created him Earl of Leicester and privy-councillor, and bestowed titles and estates on him lavishly. Her fondness for him caused his marriage with her to be regarded as certain. He, however, excited the violent anger of the queen by his marriage with the Countess of Essex in 1578. He successfully commanded an army in the Low Countries, and when England was threatened by the Spanish Armada, in 1588, he was appointed lieutenant-general. He is characterized as an ambitious and unscrupulous courtier, combining in himself the worst qualities of both sexes.

LEIGHTON (lā'ton), Frederick, Lord Leighton, painter, president of the Royal Academy, born at Scarborough in 1830, died in 1896. In 1864 he was elected an associate of the Royal Academy, and in 1869 an Academician. In 1878 he succeeded Sir Francis Grant as president of the Academy; was knighted, and was named an officer of the Legion of Honor. In 1886 he was made a baronet, and on January 1, 1896, he was made a peer. From the long list of his works special mention may be made of his *Hercules Wrestling with Death* (1871), the *Daphnephoria* (1876),

the *Music Lesson* (1877), *Sister's Kiss* (1880), *Phryne* (1882), *Cymon and Iphigenia* (1884), *Captive Andromache* (1888), and *Ball Players* (1889); and the large frescoes at the South Kensington Museum, representing the Industrial Arts applied to War, and the Arts of Peace. In addition to his pictures he has achieved a high place as a sculptor by his *Athlete Strangling a Python* (1876), and his *Sluggard* (1886). The special



Lord Leighton.

merit of his work lies in the perfection of his draughtsmanship and design, his coloring, though possessing unfailing charm of harmonious arrangement, being only thoroughly satisfactory from the decorative point of view. A fine poetic quality, conjoined with elegance in drawing and great refinement in execution, marks his whole work.

LEINSTER (lin'stér), a province of Ireland, divided into twelve counties—Wexford, Kilkenny, Carlow, Wicklow, Dublin, Kildare, Queen's County, King's County, Westmeath, Longford, Meath, and Louth; area, 7620 sq. miles. Leinster is the most favored of the four provinces of Ireland in the extent of its tillage and pasture lands, and its wealth in minerals. Pop. 1,152,829.

LEIPZIG (lip'zih), or **LEIPSIC**, the second city of the kingdom of Saxony, and one of the chief seats of commerce in Germany, 64 miles w.n.w. from Dresden. The university, founded in 1409, is the second in importance in Germany (that of Berlin being first), and has over 3000 students, and a library of 350,000 vols. Schools are numerous and good, the conservatory of music being of some celebrity. Besides being the center of the book and publishing trade of Germany, Leipzig possesses considerable manufactures, and has important general commerce, carried on especially through its three noted fairs at the New-year, Easter, and Michaelmas. Pop. 455,089.

LEITH (lēth), a seaport and parliamentary burgh in the county of Midlothian, Scotland, about 1½ mile from the center of Edinburgh. Pop. 77,439.

LEITRIM (lē'trim), a county of Ireland, bounded by Donegal Bay and the counties of Donegal, Fermanagh, Cavan, Longford, Roscommon, and Sligo, about 51 miles long by 21 broad; area, 392,363 acres. The surface in the north is somewhat rugged and mountainous, but elsewhere generally flat and in part

moorish. In the valleys the soil, resting generally on limestone, is fertile. The principal crops are oats and potatoes. The minerals include iron, lead, and copper, all at one time worked, and coal, still raised to some extent. It sends two members to parliament. Pop. 69,201.

LELAND, Charles Godfrey, American humorist, was born at Philadelphia in 1824. He was admitted to the bar in 1851, but soon relinquished law for literature, and contributed largely to periodicals. His works, many of which are of a humorous or burlesque character, include: *The Poetry and Mystery of Dreams*, *Pictures of Travels*, a translation of Heine's *Reisebilder*, *Sunshine in Thought*, *Legends of Birds*, *Hans Breitmann's Ballads*, *The English Gipsies and Their Language*, *Fu-Sang*; or, *the Discovery of America by Chinese Buddhist Priests in the Fifth Century*, *English Gipsy Songs*, *Johnnykin and the Goblins*, *Pidgin-English Sing-Song*, *Abraham Lincoln*. He is best known by his *Hans Breitmann's Ballads*. He died in 1903.

LELAND STANFORD JUNIOR UNIVERSITY, was founded by Leland Stanford and his wife, Jane Lathrop Stanford, in memory of their only son Leland Stanford, Jr., who died in 1884. It is 33 miles southeast of San Francisco.

The university maintains departments of Greek, Latin, Germanic languages, Romance languages, English, philosophy psychology, education, history, economics and social science, law, drawing, mathematics, physics, chemistry, botany, physiology and hygiene, zoology, geology and mining, and civil, mechanical, and electrical engineering. The Hopkins Laboratory of Natural History at Pacific Grove, on the Bay of Monterey is a branch of the biological work of the university. The degrees conferred are Bachelor of Arts, Bachelor of Laws, Master of Arts, Engineer, and Doctor of Philosophy. No honorary degrees are given. The ordinary class divisions are not recognized by the university, and degrees are conferred without regard to the time spent, whenever the requirements are met. Each student selects as his major subject the work of some one department, to which, together with the necessary minor subjects, he is required to devote about a third of his under-graduate course. All the rest of the undergraduate work is elective, but the professor in charge of the major subject acts as the student's educational advisor. These subjects include, besides those usually required for entrance examinations, Spanish, the natural sciences, physiography, mechanical and free-hand drawing, wood-working, forge work, foundry work, and machine-shop work. The university has a philological and a science association, and offers frequent public lectures on subjects of general interest. The building up and development of the university is due largely to the work of David Starr Jordan, who has been its only president.

LE'LY, Sir Peter, painter, born at Soest, in Westphalia, in 1617 or 1618. Lely or Le Lys was properly a nickname borne by his father, whose family name was Van der Taes. He was first in-

structed by Peter Grebber at Haarlem but came to England in 1641, and commenced portrait-painting. He finished portraits both of Charles I. and of Cromwell; but it was not until the Restoration that he rose to the height of his fame. He fell in with the voluptuous taste of the new court, and was in great favor with Charles II., who knighted him. He died in 1680. The Hampton Court collection of portraits of the ladies of the court of Charles II. contains some of his best work; the finest of his few historical works being the *Susannah and the Elders*, at Burleigh House.

LEMBERG, a city of Austria, capital of the kingdom of Galicia, on the Peltew, 365 miles e.n.e. from Vienna. Pop. 159,618.



Norway lemming.

LEMMING, a rodent mammal very nearly allied to the mouse and rat. There are several species, found in Norway, Lapland, Siberia, and the northern parts of America. The most noted species is the common or European lemming.

LEM'ON, the fruit of the lemon-tree, originally brought from the tropical parts of Asia, but now cultivated extensively in the south of Europe and in the United States, especially in California. It is of the same genus as the orange and citron, and differs little from the lime. It is a knotty-wooded tree of rather irregular growth, about 8 feet high; the leaves are oval, and contain scattered glands which are filled with a volatile oil. The shape of the fruit is oblong, and its internal structure is similar to that of the orange. The juice is acid and agreeable; and in addition to its use in beverages is employed by calico-printers to discharge colors. As expressed from the ripe fruit it has a specific gravity of 1.04, and contains about 1.5 per cent of citric acid. It also contains sugar, albuminous and vegetable matters, and some mineral matter, nearly half of which consists of potash. The oil of lemon is a volatile oil of yellow or greenish color got from the fresh rind of the lemon. It is used in perfumery, and in medicine as a stimulant and rubefacient; it also forms an ingredient of syrup of lemon and tincture of lemon.

LEMONADE, a drink made of water, sugar, and the juice of lemons. A good recipe is: two sliced lemons, 2½ oz. of sugar, boiling water, 1½ pint; mix, cover up the vessel, let it stand, with occasional stirring, till cold, then strain off the liquid. Aerated bottled lemonade may be prepared by putting lemon syrup into a bottle, and filling up with aerated water at a bottling machine.

LEMON-KALI, a name sometimes

given to the effervescing beverage formed by mixing lemon-juice with dissolved bicarbonate of potash.

LE'MUR, a name popularly given to a sub-order of monkeys. Their zoological position has been a matter of considerable debate, as they possess characteristics which distinguish them from the monkeys, and ally them with the insectivores and rodents. The simplest classification places them, however, with the lower *Quadrumanæ*. The *Lemuridæ* or True Lemurs are specially distinguished by the habitually four-footed or quadrupedal mode of progression. The tail (except in the short-tailed *Indris*) is elongated and furry, but is never prehensile. The hind limbs are longer than the fore limbs; the second toe in the hind foot being long and claw-like, and the nails of all the other toes being flat. The fourth digit of the hand and especially of the foot, is longer than the others. The thumb can always be opposed to the other fingers, and has a broad, flattened nail. The ears are small and the eyes large. The incisor teeth are generally four, the canines, two, and the molars twelve in each jaw. The true lemurs are exclusively confined to Madagascar and neighboring islands, but other members of the family are found in Africa and as far east as the Philippines. They are all arboreal in their habits, and subsist chiefly upon a vegetable diet, but also eat insects, and the smaller birds and their eggs.



Varied lemur.

LENA, a river of Siberia, one of the largest in the world, rising on the north-western side of the mountains which skirt the western shore of Lake Baikal, about 70 miles e.n.e. of Irkutsk. It flows in a winding course, and discharges itself through several branches into the Arctic Ocean in lat. 73° n., and lon. about 128° e. Its course, windings included, is about 2770 miles.

LENNI-LENAPE, the name by which the Delaware Indians call themselves. See Delaware.

LENORMANT, François, French archæologist, born 1837. After traveling in the east he became, in 1874, professor of archæology at the Bibliothèque Nationale. He died in 1883. He was an authority on the Cuneiform inscriptions and the Accadian language.

LENS, a transparent substance, usually glass, so formed that rays of light passing through it are made to change their direction, and to magnify or diminish objects at a certain distance. Lenses are double convex, or convex on both sides; double-concave, or concave on both sides; plano-convex, or plano-concave, that is, with one side plane and the other convex or concave, or convex on one side and concave on the other. If the convexity be greater than the concavity, or if the two surfaces would meet if produced, the lens is called a meniscus; and if the concavity be greater than the convexity, the lens is termed concavo-convex. See Optics, Microscope, Telescope.

LENT, the forty days' fast in spring, beginning with Ash Wednesday and ending with Easter Sunday. In the Latin Church Lent formerly lasted but thirty-six days; in the 5th century four days were added, in imitation of the forty days' fast of the Savior, and this usage became general in the western church. The close of Lent is celebrated in Roman Catholic countries with great rejoicings, and the carnival is held just before it begins. The English Church has retained Lent and many other fasts, but gives no directions respecting abstinence from food.

LENTIL, a plant cultivated in Southern and Central Europe. It is an annual, rising with weak stalks about 18 inches, and with whitish flowers hanging from the axils of the leaves. Two varieties are cultivated—the large garden lentil



Lentil.

and the common field lentil—the former distinguished by its size and the greater quantity of mealy substance which it will afford. The straw of lentils makes good fodder. As food for man the seeds are very nutritious, and in Egypt, Syria, etc., are a chief article of diet.

LEO, the Lion, the fifth sign of the zodiac, between Cancer and Virgo. The sun enters it about July 22, and leaves it about August 23. The constellation contains 95 stars, and is noteworthy for its remarkable nebulae. There is also a constellation of the northern hemisphere known as Leo Minor, and containing 53 stars.

LEO I., St. Leo, called the Great, pope born about 390. The Popes Celestine I. and Sixtus III. employed him in im-

portant ecclesiastical affairs, and on the death of Sixtus III. in 440 he was elevated to the papal chair. He was employed by Valentinian to intercede for peace with Attila, who, at his request, evacuated Italy. His death took place in 461. He is the first pope whose writings—sermons, letters, etc.—have been preserved. In his main ambition to establish the supremacy of the Apostolic chair over the whole Christian Church he was defeated at the council of Chalcedon (451), which affirmed the independence of the see of Constantinople.

LEO III., a Roman by birth, elected pope on the death of Adrian I. in 795. He commenced his rule by making submission to Charlemagne, so that when driven from Rome in 799 by his rival Paschal, Charlemagne re-established him on his throne, receiving from him in 800 the imperial crown. Leo died in 816.

LEO X., Giovanni de' Medici, second son of Lorenzo the Magnificent, born at Florence in 1475, received the tonsure in his seventh year, and was loaded with benefices. In 1488, when only thirteen years old, he was made a cardinal, and in 1492 took his seat as a member of the Holy College at Rome. Pope Julius II. made him governor of Perugia, and in 1511 placed him, with the title of Legate of Bologna, at the head of his forces in the holy league against France. After contributing to the re-establishment of the Medici he remained at Florence until the death of Julius II. recalled him to Rome. Although only a deacon, he was chosen to succeed Julius in 1513. In 1515 he had an interview with Francis I. at Bologna, and formed with him a concordat, which remained in force nearly three hundred years, and gave to the king the right to nominate bishops in his own dominions. To procure money, particularly for the completion of St. Peter's, he encouraged the sale of indulgences, an abuse which incidentally promoted the Reformation, in calling forth the attacks of Luther. Leo died suddenly in 1521.

LEO XIII., Pope, the 258 Roman Pontiff and 257 successor of Peter, was born at Carpineto in 1810. He was created and proclaimed a cardinal by Pius IX. in the consistory of December 19, 1853. He was a member of several of the congregations of cardinals—among them those of the Council of Rites and of Bishops and Regulars. In September, 1877, he was selected by Pope Pius IX. to fill the important office of cardinal camerlengo of the Holy Roman Church, which post had become vacant by the death of Cardinal De Angelis. In that capacity, after the death of Pius IX. (February 7, 1878), he acted as head of the church in temporal matters, made the arrangements for the last solemn obsequies of the pontiff, received the Catholic ambassadors, and superintended the preparations for the conclave. Sixty-two cardinals attended the conclave, which was closed in the Vatican on Monday, February 18, 1878, and the cardinal camerlengo was made Pope by the acclamation of all on Wednesday, February 20, 1878, and his Holiness assumed the name of Leo XIII. Leo XIII. had throughout behaved with

perfect consistency. He had never quitted the Vatican, but had religiously kept up the fiction of his being held there a prisoner. He refused the income voted to him, as to his predecessor, by the Italian parliament, and has never recognized the Law of Guarantees. He has protested from time to time against "godless" schools, and against tolerated heresy in Rome. But in his relations with foreign powers he has always been moderate and dexterous. He died in 1903.

LEON, a town of Spain, capital of the province and ancient kingdom of the same name, 176 miles northwest of Madrid. Pop. 15,300.—The province has the Asturias as its northern boundary, a branch of which mountains divides it into two portions. The western portion is adapted rather for pasture than tillage, but the eastern has wide and undulating plains, on which the vine and various grain crops are successfully cultivated. Area, 6166 sq. miles. Pop. 370,000.

LEON, a town of Central America, capital of the department of Leon, state of Nicaragua, on a large and fertile plain near the Pacific coast. It is regularly built, and the public buildings which are considered among the finest in Central America, include a massive cathedral, an old episcopal palace, a new episcopal palace, and several churches. A railway connects it with the coast at Corinto. The town has suffered a good deal from the civil wars. Pop. 45,000.

LEON, a town of Mexico, state of Guanajuato, on a fertile plain more than 6000 feet above sea-level, a well-built place, with flourishing industries of various kinds, which its railway connections are helping to develop. Pop. 80,000.

LEONIDAS, in Greek history, a king of Sparta, who ascended the throne 491 B.C. When Xerxes invaded Greece, the Greek congress assigned to Leonidas the command of the force destined to defend the pass of Thermopylae. His force, according to Herodotus, amounted to over 5000 men, of whom 300 were Spartans. After the Persians had made several vain attempts to force the pass, a Greek named Ephialtes betrayed to them a mountain path by which Leonidas was assailed from the rear, and he and his followers fell after a desperate resistance (B.C. 480).

LEOPARD, a carnivorous mammal



Leopard.

inhabiting Africa, Persia, India, China, etc., by some regarded as identical with

the panther. The ground or general body-color of both is a yellowish fawn, which is slightly paler on the sides, and becomes white under the body. Both are also marked with black spots of various sizes, irregularly dispersed, a number of them being ring-shaped. The African animal seems to have these ring-spots chiefly on the back, and to this form some would specially assign the name of leopard. It preys upon antelopes, monkeys, and the smaller quadrupeds, rarely attacking man unless itself attacked. It can ascend trees with great ease, often using them both for refuge and ambush. It is not infrequently trapped by means of pitfalls. Besides the common leopard there is also a useful and docile Asiatic species, chetah or hunting leopard. See Chetah.

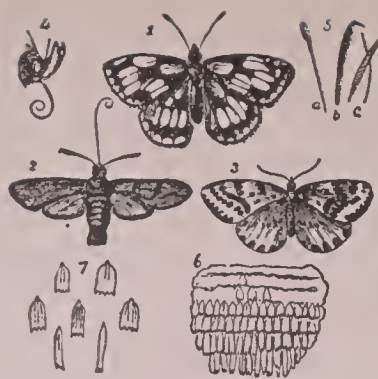
LE'OPOLD I., King of the Belgians, son of a Duke of Saxe-Coburg, was born in 1790. In 1816 he married the Princess Charlotte, heir-apparent of Great Britain, who died in 1817. In 1831 he accepted the crown of Belgium. He married a daughter of King Louis Philippe of France, by whom he became the father of Leopold II., the present Belgian sovereign. After a prosperous and uneventful reign he died in 1865.

LEOPOLD, II., Louis Philippe Marie Victor, King of the Belgians, was born in 1835. He ascended the throne on the death of his father in 1865. In 1876 he effected at Brussels the organization of the African International Association with a view of making use of the recent discoveries in Africa. He promoted this work with great energy, supplying largely from his own resources the means for Stanley's exploration of the Congo. The Congo Free State was established and the sovereignty of it was given to Leopold by the Berlin Congress in 1885.

LEPER. See Leprosy.

LEPER-HOUSES, houses for the treatment of leprosy; once very numerous in England, nearly every important town having one or more of these houses. The house of Burton Lazars in Leicestershire, built by a general subscription raised over England in the time of King Stephen, was the head of all leper-houses in England. It was dependent on the leper-house at Jerusalem. From the Crusades until the reformation these houses flourished and multiplied. Gradually, however, as better habits and treatment began to diminish diseases of the class for which they were used, these houses declined, and were abandoned or appropriated to other objects.

LEPIDOPTERA, the scientific name of the order of insects which includes the butterflies and moths (which see), and which is so named from the presence of innumerable small membranous scales, which come off like fine dust or powder when the wings (four in number) are touched by the finger. The scales are merely modifications of the hairs with which the wings of most other insects are covered; and from the presence of these scales the beautiful tints and colors of the lepidopterous insects are derived. The butterflies form the diurnal; while the moths, flying about chiefly at twilight or during the night, are termed nocturnal Lepidoptera.



Lepidoptera.

1, Butterfly—marbled white butterfly. 2, Hawk-moth or sphinx—humming-bird hawk-moth. 3, Moth—magpie moth. 4, Palpi and spiral mouth of butterfly. 5, Antennae—a, Butterfly's; b, Sphinx's; c, Moth's. 6, Portion of wing of cabbage-butterfly, with part of the scales removed. 7, Scales of do, magnified.

LEP'ROSY, a name applied at one time to several different skin diseases characterized by roughness or scabiness. True leprosy is the elephantiasis of the Greeks, the lepra of the Arabs, whose old English name was the myckle ail or great disease. It is to be distinguished from the elephantiasis of the Arabs, which is a local overgrowth of skin and subcutaneous tissue, chiefly of the extremities and genital organs, and is non-contagious. Of true leprosy there are several well-marked types. The first is characterized by the formation of nodules or tubercles in the skin, common about the eyebrows, where they destroy the hair, and produce a frowning or leonine aspect. After a time the nodules break down, forming ulcers, which discharge for a time, and may cause extensive destruction and deformity. The tubercles may form in the nostrils, in the throat altering the voice, on the eyelids extending into and destroying the eyeball. In the second type the chief features are insensibility and numbness of parts of the skin, accompanied by deep-seated pains, causing sleeplessness and restlessness. In a third variety much mutilation occurs owing to the loss of bones, chiefly of the limbs, a portion of a limb being frequently lopped off painlessly at a joint. All these varieties begin with the appearance on the skin of blotches of a dull coppery or purplish tint, the affected part being thickened, puffy, and coarse-looking. When the redness disappears a stain is left, or a white blotch. Leprosy is now believed to be caused by a minute organism—a bacillus (see Germ Theory of Disease), and to be contagious. Though the disease is not so widespread as at one time it was, it still prevails in Norway and Iceland, the coasts of the Black Sea and Mediterranean, in Madagascar, Mauritius, Madeira, the Greek Archipelago, East and West Indies, Palestine, the Pacific Islands, etc.

LERIDA, a town of Spain, province of Lerida, Catalonia, on the right bank of the Segre, here crossed by a handsome bridge of seven arches, 84 miles w.n.w. of Barcelona. As the key of Aragon and Catalonia it was early fortified, and still continues to be one of the most important military points in Spain. Pop. 21,337.—The province, bounded north by France, has an area of 4774

sq. miles, traversed by ramifications of the Pyrenees. Pop. 291,624.

LE SAGE, or **LESAGE** (lê-sâzh), Alain René, French novelist and dramatic writer, born in 1668 at Sarzeau, in Brittany. He translated Avellaneda's continuation of the Adventures of Don Quixote, and a comedy of Calderon; but his first success was with his Crispin Rival de son Maître (1707). In 1715 he published the first two volumes of Gil Blas, one of the best romances in the French language, the third volume appearing in 1724, the fourth in 1735. In 1732 he published Les Aventures de Guzman d'Alfarache (based on Aleman's work); and the following year Les Aventures de Robert, dit le Chevalier de Beauchesne, containing the real history of a freebooter, from papers furnished by his widow. In 1734 appeared L'Histoire d'Estevanille Gonzales. The last of his novels was Le Bachelier de Salamanque (1738). He died in 1747. He wrote also many theatrical pieces, etc.

LESBOS, a Greek Island situated off the northwest coast of Asia Minor, now called Mitylene, from the capital. In shape it is nearly triangular; has an area of 276 sq. miles, and a population of about 40,000, and now belongs to Turkey. The island formerly contained nine cities, the chief being Mitylene.

LESGLIANS, a Tartar people of the Mohammedan religion, inhabiting the eastern Caucasus, and forming the chief portion of the inhabitants of Daghestan. They were among the most stubborn of the Caucasian peoples in their resistance to the Russians.

LESLIE, Frank, the name assumed by Henry Carter, an American publisher and journalist, born in Ipswich, England, in 1821. He showed a natural bent for art, and contributed sketches to the Illustrated London News, signing them Frank Leslie. In 1848 he came to the United States, and in 1854 began publishing the first of his many illustrated journalistic ventures, The Gazette of Fashion. The New York Journal soon followed with Frank Leslie's Illustrated Newspaper (1855), The Boy's and Girl's Weekly, The Budget of Fun, and many others. He was commissioner to the Paris exposition of 1867, and was given a prize there for his artistic services. He died in 1880, and his wife took, by legislative act, the name "Frank Leslie," and for some years conducted the business with conspicuous success.

LESLIE, Sir John, Scottish physicist and mathematician, born at Largo, Fife, in 1766. He invented the differential thermometer about the year 1800, and four years later published his Essay on the Nature and Propagation of Heat. Through one of his contrivances, his hygrometer, he arrived in 1810 at the discovery of a process of artificial congelation, which enabled him to freeze mercury. In 1809 he published his Elements of Geometry; in 1813 an Account of Experiments and Instruments depending on the relation of Air to Heat and Moisture; in 1817 his Philosophy of Arithmetic; in 1821 his Geometrical Analysis and Geometry of Curved Lines; in 1822 a volume of Elements of Natural Philosophy; and in 1828 his

Rudiments of Geometry. He died in 1832, having been knighted not long before.

LESSEPS, Ferdinand, Vicomte de, French diplomatist and engineer, born in 1805. After holding several consular and diplomatic posts he retired from the government service, and in 1854 went to Egypt, and proposed to the viceroy the cutting of a canal across the Isthmus of Suez. This great work was successfully completed in 1859-69, under his supervision, and brought him high honors of various kinds. He subsequently proposed several other grand schemes; but the only one really taken in hand was the Panama Canal (which see). He died in 1894.

LESSING, Gotthold Ephraim, German critic, dramatist, and scholar, born 1729 at Kamentz, in Upper Lusatia. In 1755 appeared Miss Sara Sampson, a tragedy dealing with English life. In 1765 he published the *Laocoon*, or on the Limits of Painting and Poetry, and his comedy *Minna von Barnhelm*. About 1767 he became director of the National theater at Hamburg. While here he wrote his *Dramaturgie*. Besides those mentioned, he wrote another drama, *Emilia Galotti* (1772). He died at Brunswick in 1781.

LESTRANGE, Sir Roger, political controversialist, journalist, and translator, born at Hunstanton Hall, Norfolk, in 1616. He died in 1704. He was the author of a great number of coarse and virulent political tracts, and translated Josephus, Cicero's *Offices*, Seneca's *Morals*, Quevedo's *Visions*, etc.

LETH'ARGY, an unnatural tendency to sleep, closely connected with languor and debility, and much resembling apoplexy in character. It may rise from a plethoric habit, from deficient circulation in the brain, from nervous exhaustion of that organ, from a poisoned state of the blood, or from a suppression of urine. When it is the consequence of alcoholic intoxication, or of the action of narcotics, it should be treated as apoplexy.

LETHE, the River of Oblivion, one of the streams of the lower regions celebrated in ancient mythology, whose water had the power of making those who drank of it forget the whole of their former existence. Souls before passing into Elysium drank to forget their earthly sorrows; souls returning to the upper world drank to forget the pleasure of Elysium.

LETTER OF CREDIT. See Credit.

LETTER OF MARQUE. See Marque.

LETTERS. See Alphabet, Consonant, Vowel, Writings, etc.

LETTERS-PATENT, letters of the British sovereign sealed below with the great seal, conferring on a person or a public company some special or peculiar privilege. Letters-patent are issued to protect new inventions, and from the latter procedure is derived what is called patent-right. See Patent.

LETTRES DE CACHET are really *lettres closes*, that is, letters sealed in such a way that they cannot be opened without breaking the seal, and which were originally always addressed to individuals in contradistinction to *lettres patentes*, or letters patent, beginning

"know all men by these presents." *Lettres closes* interfering with the administration of justice or the liberty of the subject were forbidden by numerous edicts in the 14th, 15th, and 16th centuries, and the term *lettres de cachet*, as synonymous with *lettres closes*, is first found in the ordinance of Orleans in 1560. The convenience of such a means to consign one's enemies to prison was seen by Richelieu and Mazarin, who followed the Guise Government in using them frequently, despite numerous protestations on the part of the parlements, of which the most notable was when, in 1648, an ordinance was registered that no man should be kept in prison three days without interrogation. When once Louis XIV. had begun to rule, he made frequent use of *lettres de cachet* both for state purposes and to control and disorganize his nobility, and he boldly justified their use in an edict of 1705. But the most marked justification is to be found in the circular letter addressed to the parlements of France in reply to protests against arbitrary imprisonment in 1759, in which the king says that "he reserves arbitrary orders—in other words, *lettres de cachet*—for occasions wherein they may be necessary for the public good and the interests of families." It was the custom for the king to sign a number of blank *lettres de cachet* which his ministers gave away to whomsoever they pleased. Thus they often fell into hands of people who used them to gratify private hate; fathers obtained them and inserted the names of their sons, wives inserted the names of their husbands, opera dancers those of lovers who had spurned them. The evil grew to such a height that Turgot and Lamoignon de Malesherbes refused to enter the ministry of Louis XVI. unless they might see the contents of the orders they countersigned, and know the causes for which men were to be imprisoned. It is needless to say that when the cahiers of the primary assemblies were prepared, to instruct the deputies to the states-general in the wishes of their constituents, abolition of *lettres de cachet* were demanded in almost all the cahiers of the noblesse and tiers état. The subject was mentioned in the early debates of the constituent assembly, but *lettres de cachet* were not formally abolished till January 15, 1790, and on March 13th of the same year all imprisoned under them were ordered to be set at liberty.

LETTUCE, a smooth, herbaceous, annual plant, containing a milky juice, and in general use as a salad. The stem grows to the height of about 2 feet, and bears small pale-yellow flowers; the inferior leaves are sessile, and undulate on the margin. The young plant only is eaten, as the lettuce is narcotic and poisonous when in flower. A number of species are known from various parts of the globe. *Lactucarium*, or lettuce opium, the inspissated juice of the lettuce, is used medicinally as an anodyne.

LEUCOMA, a white opacity of the cornea of the eye, the result of acute inflammation.

LEUCORRHOEA, in medicine, a morbid discharge of a white, yellowish, or

greenish mucus from the female genital organs.

LEVANT, a term applied in the widest sense to all the regions eastward from Italy as far as the Euphrates and the Nile, and in a more contracted sense to the Asiatic coasts of the Mediterranean and the adjacent countries from Constantinople to Alexandria in Egypt.

LEVÉE, a morning reception held by a prince or great personage. The term is chiefly applied in Britain to the stated public occasions on which the sovereign receives visits from such persons as are entitled by rank or fortune to the honor. It is distinguished from a drawing-room in this respect, that while at the former gentlemen alone appear (with the exception of the chief ladies of the court), both ladies and gentlemen are admitted to the latter.

LEVEE, in America, an embankment on the margin of a river, to confine it within its natural channel, such as may be seen on the banks of the lower Mississippi.

LÉVEL, an instrument by which to find or draw a straight line parallel to the plane of the horizon, and by this means to determine the true level or the difference of ascent or descent between several places, for various purposes in architecture, agriculture, engineering, hydraulics, surveying, etc. There is a great variety of instruments for this purpose, differently constructed and of different materials, according to the particular purposes to which they are applied, as the carpenter's level, mason's level, gunner's level, balance level, water level, mercurial level, spirit level, surveying level, etc. All such instruments, however, may be reduced to three classes: (1) Those in which the vertical line is determined by a suspended plumb line or balance weight, and the horizontal indicated by a line perpendicular to it. Such are the carpenter's and mason's levels. (2) Those which determine a horizontal line by the surface of a fluid at rest, as water and mercurial levels. (3) Those which point out the direction of a horizontal line by a bubble of air floating in a fluid contained in a glass tube. Such are spirit-levels, which are by far the most convenient and accurate. All levels depend on the same principle, namely, the action of terrestrial gravity.

LEVELLING, the art or operation of ascertaining the different elevations of objects on the surface of the earth, or of finding how much any assigned point included in a survey is higher or lower than another assigned point. It is a branch of surveying of great importance in making roads, determining the proper lines for railways, conducting water, draining low grounds, rendering rivers navigable, forming canals, and the like. In ordinary cases of leveling (for example, for canals, railways, etc.) the instruments commonly employed are a spirit-level with a telescope attached to it, and a stand for mounting them on, and a pair of leveling staves. A leveling staff is an instrument used in conjunction with a spirit-level and telescope. It is variously constructed, but consists essentially of a graduated pole with a vane sliding upon it so as to mark the height at any particular distance above

the ground. In leveling two of them are used together, and being set up at any required distance the surveyor, by means of a telescope placed between them perfectly horizontally, is enabled to compare the relative heights of the two places.

LEVER, a bar of metal, wood, or other substance turning on a support called the fulcrum or prop, and used to overcome a certain resistance (called the weight) encountered at one part of the bar by means of a force (called the power) applied at another part. It is one of the mechanical powers, and is of three kinds, viz.: (1) When the fulcrum is between the weight and the power, as in the hand-spike, crow-bar, etc. In this case the parts of the lever on each side of the fulcrum are called the arms, and these arms may either be equal as in the balance, or unequal as in the steelyard. (2) When the weight is between the power and the fulcrum, as in rowing a boat, where the fulcrum is the water. (3) When the power is between the weight and the fulcrum, as in raising a ladder from the ground by applying the hand to one of the lower rounds, the fulcrum in this case being the foot of the ladder. The law which holds in the lever is: the power multiplied by its arm is equal to the weight multiplied by its arm. It is evident that when the power has a very large arm, and the weight a very small one, a very small power will overcome a great resistance. In the lever, as in all machines when a small force overcomes a great one, the small force acts through a much greater distance than that through which the great force is overcome, or as is sometimes said, "What is gained in power is lost in time."

LE'VER, Charles James, an Irish novelist, born at Dublin in 1806. Harry Lorrequer appeared in 1837. His Charles O'Malley, Tom Burke, Jack Hinton, etc., constituted a literature entirely of its own kind, unique. His later novels were more thoughtful and artistic. He obtained a diplomatic post at Florence about 1845, was appointed vice-consul at Spezzia in 1858, and in 1867 at Trieste, where he died in 1872.

LEVERRIER, Urbain Jean Joseph, French astronomer, born at Saint-Lô (Manche) 1811, died at Paris 1877. His observations on the transit of Mercury in 1845 procured him admission into the Academy of Sciences. His great work was his investigation of the irregularities in the movements of the planet Uranus, carried on simultaneously but independently with those in the same line by John Couch Adams, which led to the discovery of the planet Neptune. He entered political life in 1849, and was made a senator by Napoleon III. He succeeded Arago as director of the observatory. His tables of suns and planet are in general use among astronomers.

LEVI, the third son of Jacob and Leah. The chief incident recorded of him, as apart from his brethren, is the part which he played in the massacre of the Shechemites. Three sons went down with him to Egypt—Gershon, Kohath, and Merari (Gen. xlvi. 2). Moses and Aaron were of this tribe.

LEVI'ATHAN, a form of the Hebrew

word *livyathan*, meaning a long-jointed monster, applied in Job xli. and elsewhere in Scripture to an aquatic animal variously held to be the crocodile, the whale, or some species of serpent.

LEV'IRATE, the custom among the Jews of a man's marrying the widow of a brother who died without issue. The same custom or law prevails in some parts of India.

LE'VITES, the name generally employed to designate not the whole Jewish tribe that traced its descent from Levi, but a division within the tribe itself, in contradistinction to the priests, who are otherwise called the "sons of Aaron." They were the ministers of worship, specially singled out for the service of the sanctuary. Together with the priests they formed the sacerdotal tribe. A permanent organization was made for their maintenance. In place of territorial possessions they were to receive tithes of the produce of the land, and in their turn to offer a tithe to the priests. After the settlement in Caanan, to the tribe of Levi were assigned forty-eight cities, six of which were cities of refuge, thirteen of the total number being set apart for the priests. To the Levites was to belong the office of preserving, transcribing, and interpreting the law, and they were to read it every seventh year at the feast of tabernacles. Their position was much changed by the revolt of the ten tribes, and they are seldom mentioned in the New Testament where they appear as the types of formal, heartless worship.

LEVIT'ICUS, the name of the third book of the Pentateuch, as called from the first word of its contents. By the later Jews it was called the "Law of the Priests," and sometimes the "Law of Offerings." It consists of seven principal sections, but it may be generally described as containing the laws and ordinances relating to Levites, priests, and sacrifices. The integrity of the book is very generally admitted, the Elohist, or author of the original document (see Elohim), being credited with having written nearly the whole of it, and the rest being considered originally Elohist.

LEVY, the seizure and taking possession of the property of a person, by a proper officer, under a writ or other process of law. To constitute a valid levy the officer must take actual possession of the property. In case of personal property he should retain actual custody of it, either by locking it up or putting a deputy in charge of it; in case of real property he should enter and show by open and unequivocal acts that he has taken legal possession under his process, but in most states the judgment debtor is not ejected from the property, as his possession is subject to the levy and subsequent sale.

The term *levy* is also applied to the seizure of property under a writ of attachment. The rules as to taking possession of the property of the person named prevailing under this writ are similar to those under an execution against property.

LEWES (lō'es), George Henry, philosophical writer and contributor to most departments of literature, born in London in 1817. His first important work

was his *Biographical History of Philosophy from Thales to Comte*, originally published in 1845, and subsequently much extended and altered—a work written more or less from a Positivist point of view, and sufficiently proving his ability as a thinker and writer. His *Life of Goethe*, which won him a European reputation, was published in 1855. In 1864 he published a study on Aristotle, and in 1865 founded the *Fortnightly Review*. The chief work of his life, aiming at the systematic development of his philosophical views, is entitled *Problems of Life and Mind* (1873-77). He died in 1878. Besides the works already mentioned he wrote *The Spanish drama*; *Lope de Vega and Calderon* (1846); two novels, *Ranthorpe* (1847) and *Rose, Blanche, and Violet* (1847). His relations with George Eliot are well known. See Eliot, George.

LEWIS (lō'is), the largest of the Hebrides, separated from the mainland of Scotland by a sea 30 to 35 miles wide, called the Minch. The south portion of the island, called Harris, is in Inverness-shire, the northern and largest portion being in Ross-shire. The entire length of the island, southwest to northeast, is 52 miles; breadth, varying from 30 miles to 5 and 10 miles; area, nearly 700,000 acres. The principal town is Stornoway. Pop. of entire island, 32,160.

LEWIS, Meriwether, American explorer, born near Charlottesville, Va., in 1774. In 1801 he became President Jefferson's private secretary. When in 1803 it was decided to send an exploring expedition into the Louisiana country, for which the United States was then negotiating with France, the president accepted the promptly offered services of the secretary. Lewis chose as his companion Capt. William Clark, an old army friend. The party left the Mississippi in May, 1804, and proceeded up the Missouri to its headwaters, crossed the Great Divide, and, landing on one of the tributaries of the Columbia, followed it and then the Columbia to the Pacific. After a dreary winter on the coast they returned to the United States by much the same route, and reached St. Louis in September, 1806. (See Lewis and Clark Expedition.) He died in 1809.

LEWIS AND CLARK EXPEDITION, an expedition under the command of Meriwether Lewis and William Clark, which in 1804-06 penetrated from the Mississippi river, through territory now forming parts of Missouri, Kansas, Nebraska, South Dakota, North Dakota, Montana, Idaho, Washington, and Oregon, to the Pacific Ocean. The members of the party were the first white men to cross the continent between the Spanish possessions to the south and the British possession to the north. The expedition was sent out by President Jefferson for the purpose of exploring the Louisiana territory, immediately after its purchase from France. At times the explorers suffered terrible hardships, and were shut off from all communication from the world. Lewis and Clark collected a mass of valuable information concerning the physical characteristics, the fauna and flora, the climate, and the various Indian tribes of the territory traversed.

LEWIS RIVER, or **SNAKE RIVER**, a river of North America, which rises in the Rocky mountains, and runs north-west into the Columbia, 413 miles from its mouth; length, about 900 miles. Its course lies partly in Idaho, partly between Idaho and Oregon, and partly in Washington.

LEWISTON, a city of Maine, on the Androscoggin river, which here has a fall of 50 feet, the water power being utilized by several manufactories (chiefly of cotton and woolen goods) and extensive saw-mills. Pop. 25,170.

LEXICON. See Dictionary.

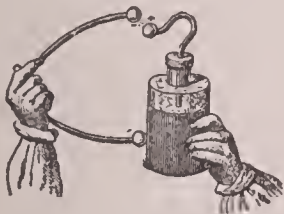
LEXINGTON, a city in Kentucky, 23 miles e.s.e. of Frankfort. It is the oldest town in the state (having been founded in 1775), and was once the capital. It is more a place of fashionable residence than of trade. There is here the Kentucky State university. Pop. 28,000.

LEXINGTON, a small town in Massachusetts, where the first British blood was shed in armed resistance to the mother country. On April 18, 1775, the advance of a detachment of British troops, sent from Boston to seize some provincial stores at Concord, was opposed by the Lexington militia (70 men) who were dispersed with a loss of seven killed and three wounded. Pop. 3197.

LEYDEN, a town in Holland, 22 miles southwest of Amsterdam, on both sides of the Old Rhine. The most important educational institution is the university, formerly one of the most famed in Europe. It is attended on the average by about 700 students, nearly one-half studying law. Leyden has cloth and other manufactures. The population, about 100,000 in the 17th century, is now 54,421.

LEYDEN, Jan, or John of. See article Anabaptists.

LEYDEN-JAR, an early form of electric accumulator, introduced to the scientific world by Muschenbroek of Leyden in 1746, hence its name. It consists of a glass phial or jar coated inside and outside, usually with tin-foil, to within a third of the top. A metallic rod, having a knob at the top, is fixed into the mouth of the jar, and is made to communicate with the inside coating, and when the jar is to be charged the knob of this rod is applied to the prime



Leyden-jar.

conductor of an electric machine. As the electric fluid passes to the inside of the jar an equal quantity passes from the outside, so that the two coatings are brought into opposite states, the inside being positive and the outside negative. The jar is discharged by establishing a communication between the outside coating and the knob. When a number of jars are placed in a box lined with tin-foil connected with the earth, their knobs being joined together, they form a battery; a quantity of electricity equal

to the sum of the charges which would be received by each jar can be collected in such a battery, capable of melting fine metallic wires, puncturing plates of glass or card-board, killing animals, rupturing bad conductors, etc.

LEZE MAJESTY, any crime against the sovereign authority of a state; treason.

LHASSA. See Lassa.

LI, LE, or CASH, the only copper coin of China, with a square hole in the middle, and an inscription on one side. Ten lis make one candareen, 100 a mace, 1000 a liang or tael, the only Chinese silver coin, average value about \$1.25. Li is also a Chinese measure of length equal to about $\frac{1}{3}$ of an English mile.

LIABILITY, any obligation enforceable at law or in equity, including legal obligations to perform acts other than the payment of money. The term is generally used, however, in a narrower sense as meaning a legal obligation to pay money: either a sum certain due and owing, as in the case of a debt, or an unliquidated sum, as in case of damages due upon tort or upon breach of contract.

LIAS, in geology, the name given to that series of strata, consisting principally of thin layers of limestone imbedded in thick masses of blue argillaceous clay, lying at the base of the Oolitic or Jurassic series, and above the Triassic or New Red Sandstone. The formation is highly fossiliferous, ammonites being found in such quantities and varieties as to be called into use in the classification of the different beds. Gryphites and belemnites are also very common molluscs. Fish remains are frequent; but of all its fossil remains by far the most important are those of the great reptiles, of which the ichthyosaurus, plesiosaurus, and enaliosaurus are representatives. Numerous remains of plants occur in the lias. See Geology.

LIBAU (lê'bou), an important seaport of Russia, government of Courland, at the mouth of the lake of the same name, on the Baltic. Its trade in corn, flax, hemp, etc., is considerable. Pop. 64,505.

LIBEL, in law, the act of publishing malicious statements with intent to expose persons or institutions to public hatred, contempt, or ridicule, and thereby provoking them to anger, causing a breach of the peace, injury to reputation, business, etc. The difference between libel and slander is, that in the former case the defamation must have been effected in writing, printing, or some other visible manner, while in the latter the offense is committed verbally. Publication is held to have taken place if the libel is seen but by one person other than the person libeled. The law distinguishes defamatory, seditious, and obscene libel. A defamatory libel may result in civil and criminal proceedings against both the publisher and the writer, but to come under this category it is essential that the libel be false, malicious (the law presuming malice in every injury done intentionally and without justification), have a tendency to provoke hatred or contempt, and that it be non-privileged. In criminal law it is a misdemeanor to publish or threaten to publish a libel; or as a means of extortion, to offer to abstain from or to

prevent others from publishing a libel. A seditious libel is one directed against the head of the state, the legislature, the courts of justice, etc., and its publication constitutes also a misdemeanor. The term obscene libel comprises any obscene publication, and the publisher thereof is liable to imprisonment with hard labor. If the charges contained in the libel are true a civil action cannot be maintained, but the truth of the libelous matter is no defense at common law; at the same time it generally secures the defendant the merciful consideration of the court. In a civil action the plaintiff recovers damages, the amount of which is settled by the jury; upon an indictment, the jury has merely to acquit the defendant or to find him guilty, after which the court passes judgment, and awards punishment, generally fine or imprisonment, or both. Recent legislation and decisions in this branch of law in Great Britain and the United States (the American laws differ but little from those of Great Britain) have a tendency to limit liability for action to purely false, scandalous, and malicious libels. Truth, if published with good motives and for justifiable ends, is now admitted as a good defense, and even motive alone, though the statements may prove untrue.

LIBERAL ARTS. See Arts.

LIBERIA, a negro republic on the west coast of Africa, founded in 1820 by liberated American slaves under the auspices of the American Colonization Society, and recognized as an independent state in 1847. It lies between the rivers San Pedro and Manna, has 500 miles of seaboard, and extends some 100 miles inland; area 14,000 to 15,000 sq. miles. The soil is fertile, well watered, and highly adapted to the cultivation of all tropical products. The chief crop is coffee, increasing quantities of which are grown from year to year and exported, other exports being palm-oil, ground-nuts, caoutchouc, and ivory. The climate is very unhealthy for Europeans. British weights, measures, and money are mostly in use. The English language predominates among the governing class, Protestant churches and schools are amply provided, and civilization is making rapid strides among the natives. The population consists of some 20,000 immigrants from the United States and their descendants, and about 1,000,000 natives; Monrovia is the capital. The government of the republic is on the model of the United States.

"LIBERTY," Bartholdi's statue, presented to the United States by the French people in 1885, is the largest statue ever built. Its conception is due to the great French sculptor whose name it bears. It is said to be a likeness of his mother. Eight years of time were consumed in the construction of this gigantic brazen image. Its weight is 440,000 pounds, of which 146,000 pounds are copper, the remainder iron and steel. The major part of the iron and steel are used in constructing the skeleton frame work for the inside. The mammoth electric light held in the hands of the giantess is 305 feet above tide-water. The height of the figure is 152½ feet; the pedestal 91 feet, and the foundation 52

feet and 10 inches. Forty persons can find standing-room within the mighty head, which is $14\frac{1}{2}$ feet in diameter. A six-foot man standing on the lower lip could hardly reach the eyes. The index finger is eight feet in length and the nose $3\frac{1}{2}$ feet. The Colossus of Rhodes was a pigmy compared with this latter-day wonder.

LIBERTY BELL, the bell which first rang to celebrate the adoption of the Declaration of Independence, July 4, 1776. It was brought to Philadelphia from England in 1752, and was recast in April and again in June, 1753, when the words "Proclaim liberty throughout all the land, unto all the inhabitants thereof" (Lev. xxv. 10), were inscribed on it. For many years it was rung annually on the Fourth of July, but on July 8, 1835, while being tolled in memory of Chief Justice Marshall, it was broken. It now hangs in the hallway of the old state house in Philadelphia.

LIBERTY, CAP OF, a cap used as a symbol of liberty. In ancient times Roman manumitted slaves put on what was termed the Phrygian cap, in token of their freedom. In modern times the name cap of liberty was given to a red cap worn by French and other revolutionaries.

LIBERTY OF THE PRESS. See Press.

LI'BRA, the seventh sign of the zodiac. At its first point the ecliptic crosses the equator to the southern hemisphere and we have then the autumnal equinox.

LIBRARY, the name given to a collection of books, and to the building in which it is located. Libraries existed in ancient Egypt and Assyria, and Pistratus is credited with the honor of introducing a public library at Athens about B.C. 337. Cicero and various wealthy Romans made collections of books, and several Roman emperors established libraries, partly with books obtained as spoils of war. By far the most celebrated library of antiquity was the Alexandrian. In the West libraries of any note were founded in the second half of the 8th century by the encouragement of Charlemagne. In France one of the most celebrated was that in the abbey St. Germain des Prés, near Paris. In Germany the libraries of Fulda, Corvey, and in the 11th century that of Hirschau, were valuable. In Spain, in the 12th century, the Moors had seventy public libraries, of which that of Cordova contained 250,000 volumes. In Britain and Italy libraries were also founded with great zeal, particularly in the former country, by Richard Aungerville; in the latter by Petrarch, Boccaccio, and others. After the invention of the art of printing this was done more easily and at less expense. The principal libraries of modern times are the National Library at Paris, with fully 2,500,000 of books and 100,000 MSS., and the British Museum library, London, with over 2,000,000 books and 100,000 MSS. The central court library at Munich, the imperial library at St. Petersburg, and the royal library at Berlin have each over a million volumes and thousands of MSS. Other large and valuable libraries are the imperial library at Vienna; the royal libraries at

Stuttgart, Dresden, and Copenhagen; the university libraries of Genoa, Prague, Göttingen, Upsal, Oxford, Cambridge, and Dublin; also the libraries of Moscow, Venice, Florence, Milan, Bologna, Naples and the Advocates', Edinburgh. The Vatican library, Rome, and the Bodleian, Oxford, are particularly valuable in rare books and MSS. The spread of education, and the consequent growing taste for knowledge, has called into existence innumerable smaller libraries, ready of access, and providing such literature as the special class of reader demand. This public library system has naturally been most developed in highly educated countries such as Germany, France, Great Britain, and the United States. The French government has established over 25,000 popular libraries in connection with primary schools. The Bureau of Education of the United States records nearly 4000 libraries with over 20 million volumes. The Congressional Library, Washington, has over a million volumes, and the public library of Boston over half a million books, while the libraries of Harvard university, Cambridge, Yale university, Newhaven, the Astor library, and the Mercantile Library Association, New York, possess each several hundred thousand volumes.

LIBRARIES, statistics of twenty leading libraries in the United States show that, of over \$500,000 spent, a little more than \$170,000 was devoted to books, while other expenses consumed \$358,000. In the Mercantile Library of New York City it costs 14 cents to circulate a volume; in the Astor, $14\frac{1}{2}$ cents are spent on each volume, or 27 cents on each reader; in Columbia College Library, $21\frac{1}{2}$ cents per reader; in the Library Company of Philadelphia, 26 cents per volume, or 10 cents per head. The largest library in the world is the National Library of France, founded by Louis XIV., which now contains 1,400,000 books, 30,000 pamphlets, 175,000 manuscripts, 300,000 maps and charts, 150,000 coins and medals, 1,300,000 engravings, and 100,000 portraits. The Library of Congress is the largest in this country, containing over one million volumes. There are in the United States about 6,000 libraries.

LIBRARY OF CONGRESS, The (the National Library of the United States), established in 1800, destroyed in 1814 by the burning of the capitol, afterward replenished by the purchase by congress of the library of ex-President Jefferson, suffered again by a fire in 1851, which reduced it to 20,000 volumes. The collection has now come to be the largest in the Western Hemisphere and one of the half-dozen largest in the world, containing over one million printed books and pamphlets, over one hundred thousand manuscripts, 65,000 maps and charts, 35,000 pieces of music and 135,000 prints. It is rich in history, political and social science, public documents, and in Americana, including important files of American newspapers and original manuscripts. From 1800 to 1897 it remained at the capitol; in 1897 it was removed to the building erected for it under acts of congress. It is the largest and most magnificent library building in the world. It has a floor

space of nearly eight acres; book-stacks which contain about forty-five miles of shelving and space for 2,200,000 octavo volumes, able to be so extended as to accommodate over 4,000,000 volumes; and provision for nearly a thousand readers at a time. The library is open from 9 a.m. to 10 p.m. on every weekday, and from 2 p.m. until 10 p.m. on Sundays and most holidays. For reference it is freely accessible without formality; but the privilege of drawing books for home use is at present in general limited to members of Congress and certain other classes.

LIBRATION, in astronomy, an apparent oscillatory motion of the moon, arising from the fact that it does not move round the earth with a uniform angular velocity exactly equal to its angular velocity of rotation on its axis, and that its axis is not at right angles to the plane of its orbit, but is inclined $1^{\circ} 32' 9''$. In this way instead of seeing exactly one-half of the moon's surface we see about $\frac{4}{5}$ ths, parts at the edge of the disc and also at the poles being sometimes visible and sometimes out of sight.

LIB'YA, an ancient name for all Africa west of Egypt, or used as equivalent to Africa, the real shape and dimensions of which were unknown.

LICE, wingless insects which occur as parasites upon the bodies of birds and mammals. Two distinct groups are recognized among the forms united under the common name lice: the one, the bird-lice, forming a distinct order, the others which occur upon mammals being included as a group. The bird-lice have their jaws fitted for biting. They live almost exclusively upon birds, each species of which has its peculiar parasite. They feed upon the feathers and dead skin, and it is to rid themselves of these pests that hens, etc., roll themselves in the dust. In a few cases, as the goat and sheep, they feed upon the wool or hair. The true lice have the mouth-parts, like those of the true bugs, fitted for piercing the skin and sucking the blood of their host. In some cases they manage to burrow entirely under the skin. Their feet are shaped something like pipe-tongs, enabling them to hold firmly to the hairs among which they move. They lay their eggs in firm capsules attached to the hairs, and the young pass through various changes. Man is subject to the attacks of three different species of lice: the head-louse, the body-louse, and the crab-louse. Other mammals have their own parasites. The best remedy for these pests is cleanliness.

LICENSE, in law, the grant of permission to do some lawful act, also the document conferring such authority. All civilized countries require that persons should not carry on certain trades or professions, or do certain acts, without previous grant of license, and such licenses may be imposed for the sake of regulating traffic or raising revenue. Most numerous are licenses issued to empower persons to sell certain articles. The articles not to be dealt in without a license include: beer, cider, wines and spirits, tobacco and snuff, patent medicines, gold and silver, game, sweets; besides these there are licenses for

auctioneers, appraisers, armorial bearings, carriages, dogs, guns, hawkers and peddlars, male servants, pawnbrokers etc.

LICHEN (lî'ken or lich'en), in medicine, a skin disease affecting adults. It consists of a number of pimples, red or white in color, either clustered or disseminated over the surface of the skin, with or without fever, or derangement of the digestive organs, usually terminating in slight desquamation, and very liable to recur, though not contagious. There are several varieties of this eruption, but in the milder forms all that is necessary is to avoid excess, especially in rich food and the use of stimulants, and to take a light diet, with diluent drinks, and a gentle laxative occasionally. Strong external applications should not be employed, but lotions of lime-water, or weak solutions of the bicarbonate of ammonia, afford relief. The prickly heat so well known to dwellers in tropical climates, is a species of lichen.

LICHENS, a very extensive order of flowerless plants. According to a modern theory lichens are not simple plants, but are fungi parasitic on algæ, the two being mutually dependent. They have neither stem nor leaves, but consist mainly of a thallus deriving its nourishment from the air. They are reproduced by spores contained in fruits called apothecia, which are regarded as the fungi of the particular lichen. They are common everywhere, commonly in the form of flat crusts, sometimes of foliaceous expansions, adhering to rocks, the trunks of trees, barren soil, etc. They are found flourishing to the very edge of perpetual snow, and one species, the reindeer-moss, grows in the greatest profusion in the Arctic regions, where it forms the reindeer's chief sustenance. The Iceland-moss is also abundant in the Arctic regions, and often affords aliment to the inhabitants. Several other lichens afford dyes of various colors, these being chiefly obtained from rocks in the Azores and Canaries. Litmus is also obtained from a lichen.

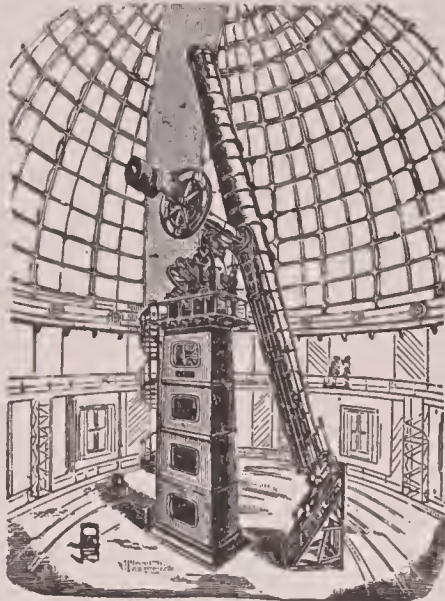
LICK, James, American philanthropist, born in Fredericksburg, Lebanon Co., Pa., in 1796. In 1847 he settled in California, where he invested in real estate and became very wealthy. He gave \$700,000 to the University of California for the erection of an observatory, and procuring therefor a telescope superior to and more powerful than any ever before constructed, and made other worthy bequests. He died in 1876.

LICK OBSERVATORY, an American observatory on Mount Hamilton (4200 feet), 60 miles s.e. of San Francisco, California, founded by James Lick, a piano manufacturer (1796-1876), and formally handed over to the University of California in 1888. It is supplied with instruments of the most perfect kind, and in particular possesses a refracting telescope with an object-glass 36 inches in diameter, being the next largest lens in existence.

LICTORS, in Rome, were the public servants who attended upon the chief magistrates, consuls, prætors, etc., to clear the way for them, and cause due respect to be paid to them. They carried

axes tied up in bundles of rods, called fasces, as ensigns of office, and were selected from the lower class of free men. The number of lictors preceding the state dignitaries depended upon the rank of the latter.

LIEBER, Francis, a German-American writer, born at Berlin 1800, died at New York 1872. In 1827 he edited the *Cyclopedia Americana*, based



Lick observatory 36-inch telescope.

on the German Conversations-Lexikon. The South Carolina College, Columbia, elected him in 1835 professor of history and political economy, a post he held until 1856, when he accepted a similar appointment in Columbia College, New York. He has written many books and pamphlets on morals, education, and political economy, and some of them have been translated into French and German.

LIEBIG (lê'bih), Justus, Baron von, one of the most eminent of modern chemists, born at Darmstadt 1803, died at Munich 1873. He first secured the attention of the chemical world in 1824 by reading a paper before the French Academy of Sciences on fulminic acid and the fulminates, the true composition of which were until then unknown. This also gained him the favor of Humboldt, and through the latter's influence he was appointed extraordinary, and in 1825 ordinary professor of chemistry at the University of Giessen, a chair he held for 25 years. In 1850 he replaced Professor Gmelin at Heidelberg, and in 1852 he accepted the chemistry chair at Munich, with charge of the laboratory. The Munich Academy of Sciences elected him president in 1860. Liebig is regarded as the founder of organic chemistry, owing to the many discoveries he made in this department. He did much to improve the methods of analysis; his Chemistry of Food has brought about a more rational mode of cooking and use of food; while agriculture owes much to his application of chemistry to soils and manures.

LIEGE (li-âzh), a town of Belgium, capital of the province of same name, 54 miles east by south of Brussels. Liege is the principal manufacturing town of Belgium, its foundries, firearms, metal,

and tool manufactures being very extensive; besides these there are important woolen-mills, tanneries, and printing-offices. It has many fine examples of Gothic architecture, including its cathedrals, the church of St. Jacques, and others, and its public buildings are mostly elegant structures. The town is rich in collections of various kinds, and has a university with a large library. Pop. 157,760.—The province has an area of 1117 sq. miles, with a population of 835,800. Until 1795 it was an independent state, governed by prince-bishops of the German empire; in that year France included it in the department of the Ourthe, but it was restored to Belgium in 1815, excepting certain portions annexed to Prussia.

LIEGNITZ (lêh'-nits), a town of Prussia, in the province of Silesia, 40 miles w.n.w. of Breslau. Pop. 54,839.

LI'EN, in law, in its most usual acceptation, signifies "the right which one person, in certain cases, possesses of detaining property placed in his possession belonging to another, until some demand which the former has is satisfied. Liens are of two kinds: 1, particular liens, that is, where the person in possession of goods may detain them until a claim, which accrues to him from those identical goods, is satisfied; 2, general liens, that is, where the person in possession may detain the goods, not only for his claim accruing from them, but also for the general balance of his account with the owners. See Mechanics Lien.

LIEUTENANT, in military language, the officer next below a captain. The distinction between first and second lieutenants exists in the British army and in that of the United States. A lieutenant in the navy is the officer next in command to the captain of the ship. He takes rank both in the British and United States' services with a captain in the army.

LIEUTENANT-COLONEL, the intermediate rank between major and colonel. In the United States army his duties are to assist the colonel in command of the regiment.

LIEUTENANT-COMMANDER, an officer of the United States navy above the rank of lieutenant and below that of commander. The grade was established upon the reorganization of the navy in 1862. Lieutenant-commanders rank with majors in the army and have the same pay when at sea, but on shore duty their pay is 15 per cent less.

LIEUTENANT-GENERAL, in February, 1864, an act of congress was passed directing that the grade of lieutenant-general be again revived (General Scott having retired in 1861). On March 2, 1864, Major-Gen. U. S. Grant received the appointment, followed on July 25, 1866, by Major-Gen. W. T. Sherman, the grade of general having been revived for Lieutenant-General Grant. When the latter was elected president of the United States, Lieutenant-general Sherman was made general, Major-Gen. P. H. Sheridan becoming lieutenant-general. An act of congress, 1870, abolished the office of lieutenant-general and general as soon as vacated. Major-Gen. J. M. Schofield

was promoted to the grade of lieutenant-general by act of congress on February 5, 1895, retiring from active service as such on September 29, 1895. Major-Gen. N. A. Miles succeeded as commanding general of the army, the rank of lieutenant-general being again revived and conferred on him in 1900.

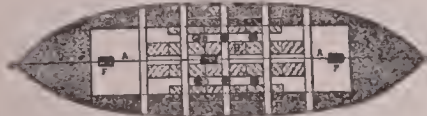
LIFE, to give an unobjectionable definition of life is impossible, as whatever the definition may be it will probably err either from redundancy or defect. Life has been defined as: "the sum total of the forces that resist death," "the constant uniformity of phenomena with diversity of external influences," "the special activity of organized bodies," "organization in action," "a collection of phenomena that succeed each other during a limited time in an organized body," "the twofold internal movement of composition and decomposition, at once general and continuous." Herbert Spencer's conception of life is: "The definite combination of heterogeneous changes, both simultaneous and successive in correspondence with external coexistences and sequences." Mr. G. H. Lewes suggests the definition: "Life is a series of definite and successive changes, both of structure and composition, which take place within an individual without destroying its identity."

LIFE-ASSURANCE. See Insurance.

LIFE-BOAT, a boat for saving persons from shipwreck. The first life-boat was patented in Great Britain by Lukin in 1785, but Henry Greathead introduced an improved form in 1789 which proved very successful, and till 1851 was almost the only one in use. A boat approved by the Royal National Life-boat Institution of Britain is now the recognized English model, and possesses in the highest degree all the qualities which it is desirable that a life-boat should pos-



Sectional Elevation of Life-boat.



Deck plan of life-boat.

A, Deck; B, Relieving tubes; C, Side air-cases; D, End air-chambers; E, Ballast; F, Air-scuttles; G, Scuttle for air and pump.



Midship section.

A, Side air-cases; B, Relieving tubes; C, Spaces packed with cork; d, Ventilation scuttle.

sess:—1. Great lateral stability, or resistance to upsetting. 2. Speed against a heavy sea. 3. Facility for launching and taking the shore. 4. Immediate self-discharge of any water breaking into her. 5. The important advantage of self-righting if upset. 6. Strength. 7. Stowage-room for a large number of passen-

gers. The life-boat transporting carriage is an important auxiliary to the boat. The life-boat is kept on this carriage in the boat-house ready for immediate transportation to the spot most favorable for launching to the wreck. In this way a greater extent of coast can secure the benefits of the life-boat than could otherwise be the case; besides, a boat can be readily launched from a carriage through a high surf, when without a carriage she could not be got off the beach. The machine is admirably contrived, and the boat may be launched from it in an upright position with her crew on board. The life-saving service of the United States is chief among the life-boat societies of the world. It is supported by government funds, and the Atlantic and some of the lake coasts are now studded with life-saving stations, provided with suitable boats, appliances, and houses of refuge for the saved.

LIFE-BUOYS, LIFE-RAFTS, ETC. Various kinds of buoys or other apparatus for the preservation of human life in



Seaman with life-belt (of cork).

cases of shipwreck or danger from drowning in other circumstances have been introduced from time to time, constructed in all sorts of shapes and materials. India-rubber has been largely used in the construction of life-buoys, generally in the form of belts which can be easily inflated by the wearer in the course of a few seconds. They are very buoyant and portable, but easily punctured or torn, and soon decay if put aside while damp. Hence the interior has come to be divided into cells, so that the rupture of one affects only a partial damage. Another sort is in the form of a waistcoat; and inflated pillows and mattresses made on the same principle have been found very effective. Naval officers have also strongly recommended mattresses stuffed with cork. The life-buoy most favored by seamen of late years is composed of slices of cork so neatly arranged that they form a buoyant zone about 32 inches in diameter, 6 inches wide, and 4 inches thick. It contains about 12 lbs. of cork, is compactly covered with painted canvas to protect it from being injured by the water, and furnished with looped life-lines, that several, if necessary, may at once have a convenient hold. The belts in use by the Royal Life-boat Institution are made of cork fastened in canvas, securing great buoyancy with strength, while they afford at the same time a certain amount of protection in cases of contact with rock or wreck, and some degree of

warmth. Various new life-saving suits have been shown at recent exhibitions.

LIFE-INSURANCE. See Insurance.

LIFE-ROCKETS, projectiles by means of which a rope is thrown either from a ship in distress to the shore or from the shore to the ship, generally the latter. The most reliable missiles are those that are discharged from a mortar or gun by gunpowder, having a line attached to them. The life-mortar of Captain Manby, invented in 1807, is practically still that in use, though variations in details have been made on it from time to time. His missile was a shot with curved barbs, resembling the flukes of an anchor, to grapple the rigging or the bulwarks of a ship. An ingenious rocket-apparatus now in use is Rogers' life-anchor. It consists of a three-fluked anchor, 12 lbs. in weight, having the flukes so hinged that they pack closely together. When the anchor has been shot out from a mortar 100 or 200 yards, the flukes open and fasten to the beach or to a ship, and thus establish a communication between the two for dragging boats or men ashore. The best lines are those made of loosely-spun Italian hemp. There are several ways of arranging or faking the line so that it may run out quickly without kinking or entangling. The sling life-buoy is employed in conjunction with the rocket apparatus, after communication has been established by a rope from the shore to the vessel. It consists of a circular cork life-buoy, having a pair of canvas breeches attached to it. The legs of the occupant protrude below the breeches, while his armpits rest on the buoy. The shipwrecked are by this means brought to the shore one by one, the buoy being drawn backward and forward by means of a traveling block. Or the life-car, a sort of covered boat, may be used to convey the men ashore.

LIFTS, Hydraulic, etc., contrivances now in common use for raising goods or persons from one story of a building to another. They consist usually of a cage or platform suspended by a rope or chain, and rising vertically in a shaft within the building, the motive power being the pressure of water on the plunger of a hydraulic press. Ships also are lifted for repair by means of contrivances called lifts, which are either screws, hydraulic-presses, or balance-pontoons. Many lifts are worked entirely by steam-power, and have no water-ram. The lifts in mills, grain and wool stores, etc., are now generally called elevators; and in the United States this term is applied to almost every description of lift.

LIGAMENT, in anatomy, the strong tendinous, inelastic white bodies which surround the joints, and connect bones or strengthen the attachments of various organs, or keep them together. Every joint is surrounded by a capsular ligament; the tendons at the wrist and ankle are bound down by what are called the annular ligaments. In dislocation of joints the capsular ligament is often broken.

LIGHT, the agent which enables us through the organ of sight to take cognizance of objects; it has a heating and chemical action which is all-important to

animals and plants; without it there would probably be neither animal nor plant life. The sun, the fixed stars, nebulae, certain meteors, and terrestrial bodies in a state of incandescence or phosphorescence are self-luminous. The origin of light has been explained by two main theories, the emission or corpuscular theory adapted and developed by Newton, and the undulatory or wave theory, the fundamental principles of which were laid down by Huygens and Euler. Newton held that the sun and other light-giving bodies threw off, with immense velocity, vast numbers of infinitely minute particles of matter, which passed into space, and by their mechanical action upon the eye brought about the sensation of light. Numbers of distinguished men accepted this theory, and many of the phenomena of light were plausibly explained by it. Huygens suggested that light was due to some sort of wave motion transmitted through a medium. His theory, offered toward the end of the 17th century, made little progress until the beginning of the present century, when its truth was amply established by the labors of Young, Fresnel, and others; and it is now universally accepted. Though we are warranted in recognizing the existence of the transmitting medium called ether, of its nature we know as yet next to nothing. Rays of light proceed in straight lines, and when a screen is removed to twice or three times its distance from a luminous point it receives only one-fourth or one-ninth of the light per unit of area which it received formerly. This is the law of inverse squares, or,—the intensity of the light received from a luminous point is inversely proportional to the square of the distance from the point. Advantage is taken of this fact in determining the relative illuminating powers of two sources of light by means of the photometer. In 1676 Rømer discovered that light is not instantaneously propagated from luminous bodies to the eye; and he calculated its velocity. Bradley, Foucault, Fizeau, Cornu, etc., made similar measurements, and it has been determined that light travels at the rate of about 186,000 miles per second.

When light falls upon the surface of a body part of it is reflected. When the surface is smooth and regular an eye placed to receive the reflected rays generally observes an image of the source of light, and the surface may be called a mirror. When it is not smooth the light which falls upon it is scattered in all directions, so that the surface itself becomes visible; planets and nearly all terrestrial objects become visible in this way by means of reflected solar light. While part of the light which falls upon the surface of a body is reflected part enters into the body, which absorbs or destroys a certain amount of it and may allow the rest to pass through. When light falls nearly vertically on a glass surface very little of it is reflected, but as the incidence becomes more and more oblique a greater and greater proportion of the light is reflected. Polished metals, particularly silver, are good reflectors of light at all incidences, and hence metallic surfaces are most commonly used as mir-

rors. The law of reflection was known to Archimedes; it is—the incident and reflected rays make equal angles with a perpendicular to the surface, and lie in the same plane with it. When a ray has passed obliquely from air into water, although in the water as in the air it is a straight line, this is not a mere continuation of its old path; it is bent to some extent at the point where it enters the new medium, the bending of the ray being called refraction. This bending of a ray when it passes from one medium, such as air, into another homogeneous medium, such as glass or water, or from air into denser air, is subject to a particular law. The law of refraction was discovered in the 17th century; it is—whatever be the obliquity of a ray passing from one medium to another, the sines of the angles made by the incident and refracted rays with the perpendicular to the refracting surface are in a constant ratio, which has been called the index of refraction. When a ray of light passes through a medium, such as the atmosphere, which continuously varies in density from place to place, its direction continuously changes, so that it is a curved line, a fact to which the phenomenon of the mirage is due. The application of mathematics to the two laws of reflection and refraction is called optics; this science includes the formation of images by mirrors and lenses, the eye, microscopes, telescopes, etc. See Optics.

Newton found that red light is not so much refracted as blue light when it passes from one medium to another. When a ray of solar light is refracted in passing through a glass prism he found that a great number of rays of different colors left the prism, the blue ray being most bent from its former path and the red ray least. (See Prism, Rainbow.) Letting these rays fall upon a screen he obtained a band of colors which he called a spectrum. Thus he had decomposed solar light and found it to consist of a mixture of lights of every gradation of refrangibility. On permitting all the colored rays to pass through a lens before falling on the screen they combined and became white light again. Newton failed to observe one peculiar feature of the spectrum which has since been studied, and has led to important results—namely, that it was not really continuous, but was crossed by a number of dark lines. From this has arisen the instrument called the spectroscopic and the branch of physics called spectrum analysis. See these arts.

In Newton's experiment with solar light and the prism we find that the blue and green rays very slightly affect a thermometer, the yellow rays affect it slightly, and the extreme red rays possess great heating properties; moreover, when the thermometer is passed beyond the red into a space in which there are no luminous rays a maximum heating effect is produced. Again, the red and yellow rays are all but incapable of blackening photographic paper, whereas the blue and violet rays exert a rapid chemical action, and this is even exceeded by the invisible rays beyond the violet. It is evident then that (1) some of the solar rays which pass through the

prism do not affect the retina; these rays are either less refrangible than red light, or are more refrangible than violet; (2) the least refrangible solar rays possess most heating power; (3) the most refrangible rays are capable of exerting the most powerful chemical action. As glass prisms absorb many of the heat rays it is convenient to use prisms of rock-salt in examining the heat (red) end of the spectrum.

Young showed that two rays of light may destroy each other's effects and produce darkness. He applied this discovery to the explanation of many natural phenomena, such as the colors in mother-of-pearl, on soap-bubbles, etc. It has also been shown that rays of light may bend round obstacles. When a ray of light enters Iceland-spar it divides into two rays which travel in different directions; these two rays possess peculiar properties which are not exhibited by ordinary rays of light, and are said to be polarized. These polarized rays cannot be made to interfere or destroy each other's effects, but either of them may be divided into two interfering rays. These and other allied phenomena are accepted by physicists as proofs that (1) there exists throughout all space a very elastic medium of small density, known as the ether; (2) the particles of all bodies are in a state of vibration; a rise in temperature of a body indicates an increase in the rapidity of vibration of its particles; (3) radiation of heat consists in the communication of these vibrations from the particles of a body by the ether to all parts of space; (4) when these vibrations communicated by the ether become rapid enough they are able to affect the retina of the eye and are then called light; (5) lights differ in color when their vibrations are not executed in equal times; (6) the vibrations of particles of the ether are all executed at right angles to the direction of propagation of the light; (7) in a ray of polarized light the vibrations are all executed at right angles to a certain plane called the plane of polarization; (8) the planes of polarization of the two rays in Iceland-spar mentioned above are at right angles to one another.

LIGHT. See Aberration.

LIGHT, Artificial, any kind of illuminant for supplementing the light of the sun. Some form of artificial light must have been in use for domestic purposes from the very earliest times, but, though large cities and a high state of civilization existed among the Egyptians, Greeks, and Romans, the systematic lighting of streets was unknown to them. From the writings of Libanius, however, who lived in the beginning of the 4th century after Christ, we may conclude that the streets of his native city, Antioch, were lighted by lamps, and Edessa, in Syria, was similarly illuminated about A.D. 500. Of modern cities Paris was the first to light its streets. In the beginning of the 16th century it was much infested with robbers and incendiaries, so that the inhabitants were ordered, in 1524, to keep lights burning after nine in the evening, before all houses fronting a street. In 1558 falots (a large vase

filled with pitch, rosin, and other combustibles) were erected at the corners of the streets. In London the inhabitants were instructed to hang out candles in 1668. A more definite order was issued in 1690. Every house-keeper was required to hang a light or lamp, every night as soon as it was dark, between Michaelmas and Lady-day, and to keep it burning till the hour of twelve at night. Successive acts of parliament and orders of the common council provided from time to time for the better lighting of London. The Hague commenced street lighting in 1552, Hamburg in 1675, Berlin in 1679, Copenhagen in 1681, Vienna in 1684, Hanover in 1696, Leipzig in 1702, and Dresden in 1705. The application of coal gas to economical purposes by Murdoch in 1805 opened a new era in artificial lighting. See Electric Light, Gas, Paraffin, Petroleum.

LIGHT, Electric. See Electric Light.

LIGHT CAVALRY, or Horse. See Cavalry.

LIGHTER, a large, open, flat-bottomed vessel, employed to carry goods to or from a ship.

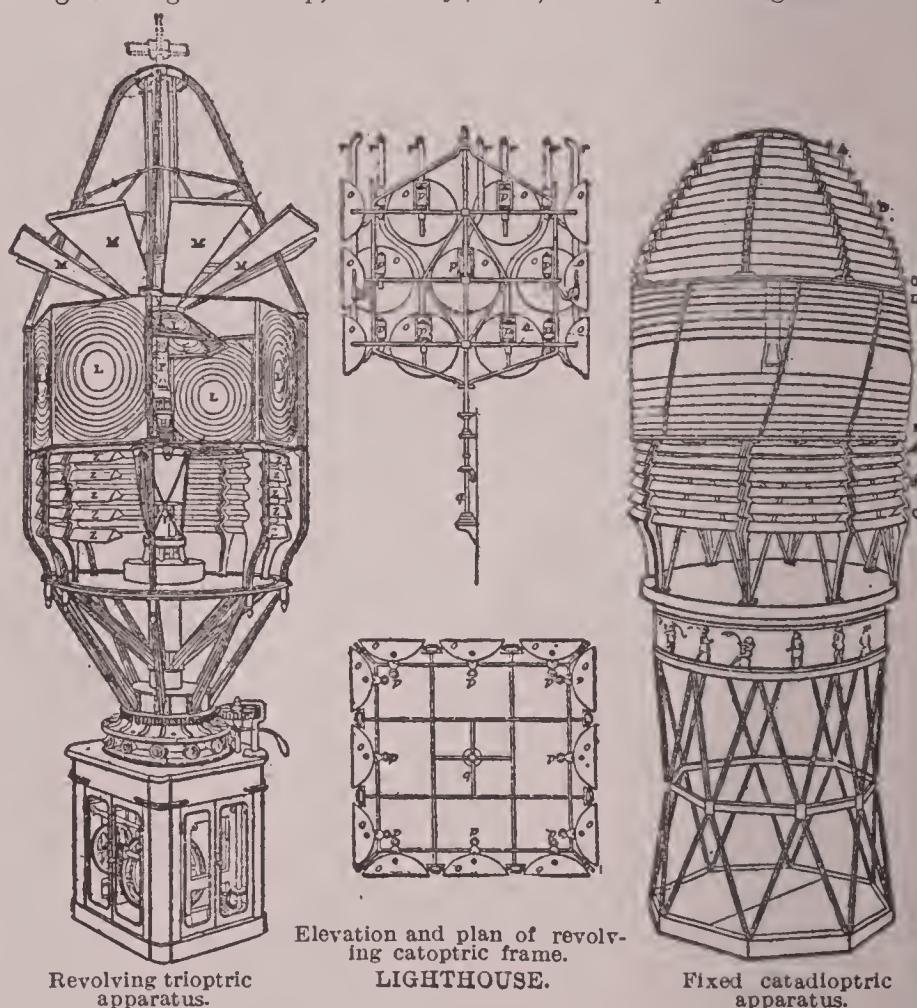
LIGHTHOUSE, a tower or other lofty structure with a powerful light at top, erected at the entrance of a port or on some rock or headland, and serving as a guide or warning of danger to navigators at night. The Pharos of Alexandria, founded about 300 B.C., is the earliest building erected expressly as a lighthouse of which we have any authentic record. It is stated to have been 550 feet high. Lighthouses are supposed to have been erected by the Romans at Flamborough Head, Dover, and Boulogne. In modern times the first important lighthouse erected was the Tour de Cordouan, at the mouth of the Garonne in France, founded in 1584 and completed in 1610, altered and improved in 1727. It is 197 feet in height, and in architecture surpasses all other lighthouses in the world. In the United States the lighthouses are under the Lighthouse Board, which has charge of all buoys, beacons, etc., on the coasts and waters of the States. The earlier lights were simply of wood, and later fires of coal exposed in open chaffers upon the top of a tower. When oil was first introduced as an illuminant is not known. An immense improvement in lighting was made a few years previous to the French revolution by the introduction of parabolic reflectors, which concentrate and throw forward in a horizontal direction the rays of light proceeding from lamps placed in their foci. At the same time the revolving frame carrying the lamps and reflectors was introduced, which has proved of the greatest utility in establishing a distinction between lights. The reflectors are composed of sheet-copper plated with silver, and formed into a parabolic curve by a laborious and delicate process.

To enable seamen to distinguish one lighthouse from another, lights in proximity are arranged to exhibit different characters. The characters in common use are: fixed light; flashing light, showing one flash at intervals of a few seconds; group-flashing lights,

showing two or more flashes in quick succession followed by a longer period of darkness; occulting lights, which show a fixed light and are eclipsed for a few seconds at regular intervals. A system of alternate flashes and eclipses (on the Morse alphabet principle) has been in some cases adopted to mark particular lights. Colored lights, red and green, are also used with any of the foregoing characters to produce further distinctions, but in general only to mark danger arcs, or in conjunction with a white flash, as the tinted-glass shades required seriously impair the power of the light, the color of which, moreover, is not easily distinguishable in foggy weather. The use of flashing and occulting lights is becoming more and more common, few fixed lights being now set up, and many

months; a luminous paint has also recently been applied with advantage to buoys. The electric light has been adopted for a number of lighthouses, and recent experiments prove it to be the most powerful and penetrative of all lights.

LIGHTNING, a sudden illumination of the sky caused by a discharge of electricity from one cloud to another, from a cloud to the earth, or from the earth to the cloud. The last-mentioned discharge is called the "backstroke." Lightning comes and goes so quickly that even while we see the stroke it is no longer there. What we see is the image that has been produced on the retina. Lightning never travels backward. The zigzag pictures one often sees, in which the streak returns on itself, is the pure imagination of the



Revolving trioptric apparatus.

Elevation and plan of revolving catoptric frame.
LIGHTHOUSE.

Fixed catadoptric apparatus.

having been converted. To produce the various characters requires the use of a revolving apparatus bearing the lenses.

Oil, particularly mineral oil, is commonly employed at present, and it is likely to remain in use in isolated lighthouses. Gas has been substituted for oil in some lighthouses. With gas an eclipse can be simply produced by a partial stoppage in the supply pipes, and there is no such waste of light as when oil is employed. Gas has been successfully employed in illuminating buoys for the guidance of vessels. The buoys (which, of course, are gas and water tight) are charged to a pressure of perhaps ten atmospheres, giving a continuous light for three or four

artist. The speed at which the current travels is 186,000 miles a second—about the same speed of light itself. For a long time it was believed that the thunder which accompanies lightning was caused by the collapse of the air, as in an ordinary explosion. This is a wrong notion. To understand why this is so, we must first understand what lightning really is. The flash we see is not electricity at all. Electric currents are wholly invisible. The flash is caused by the air being heated so highly by the discharge that it becomes brilliant along the line of the discharge. A lightning flash, therefore, is nothing but a gigantic electric spark, precisely the same as the spark one draws with his finger when he touches a live wire. It is the air which is heated.



Flashes of Lightning, showing how the current flows from cloud to earth and back to cloud, and from cloud to cloud.

The lightning stroke is made by the heating of a large quantity of air, the spark by the heating a small quantity. And the crack which accompanies the spark is produced by the same cause which produces the thunder clap. Both are precisely the same in nature.

Now the difference between the thunder peal and the noise made by a cannon, or other explosion is shown by the fact that the explosion will shatter glass and even throw down buildings, while a thunder peal, even when much louder, does not break glass at all. This is due to the fact that in the lightning stroke there is no collapse of air worth mention, but only a molecular agitation which produces sound waves.

The different kinds of lightning such as "fork," "sheet," and "chain" lightning are due to the degree in which the clouds reflect the stroke.

LIGHTNING-ROD. See Conductor.

LIGHT-SHIP, or LIGHT-BOAT, a vessel, usually single-masted, serving as a lighthouse in positions where a fixed structure is impracticable. Octagonal lanterns, fitted with Argand lamps placed in the foci of parabolic reflectors, are usually hoisted on the mast; but they are less efficient and more expensive in maintenance than land lights.

LI HUNG CHANG (lê húng chäng), Chinese statesman, born in Lu-chow-Ngan-hwei Province in 1823 (or 1819). In 1864 he became governor of the Kiang Provinces, in which capacity he was intrusted with the task of putting down the Taiping rebels who had continued to hold their own. Li Hung Chang was successful in suppressing the rebellion. Li now became successively commander of the Chinese Imperial forces, an earl, head of the naval administration, and viceroy of the capital province of Chi-li. This last appointment placed him practically next the throne, and he held it for the exceptional period of twenty-four years, from 1870 to 1895. The war with Japan found him in a position of great responsibility. He had been instrumental in bringing on the war, and he had to bear the brunt of the defeat which followed. In 1896 he represented China at the coronation of Emperor Nicholas II. of Russia, and then made a tour of the world, passing through Germany, France, England, and the United States, received everywhere with high honors. Upon his return to China he became the virtual head of the Tsung-li-Yamen or foreign office. He returned to the governorship of the Kiang Provinces in 1900, but was soon recalled to the governorship of Chi-li and his former extensive power, because he was the only man who could be relied upon to meet the emergency in the foreign relations of the empire produced by the Boxer outbreak. His last public task was the settlement with the European powers and the United States of the issues raised by that trouble. He died November 7, 1901.

LIGUORI (lig-ü-ô'rê), Alphonso Maria de, an Italian prelate, born 1696, died 1787, the founder of the sect called Redemptorists, or Ligorists. In 1732 he founded a monastery at Villa Scala (Principato Citra) with the approbation

of the pope, the members of which, forming the Order of the most Holy Redeemer, were to be employed in the instruction of the people. In 1762 he was appointed bishop of Santa Agata de' Gotici (in the Principato Ultra) by Clement XIII., which office he held until his retirement in 1775 to Nocera de' Pagani, the chief seat of his order. Since 1816 his name has been enrolled among Roman Catholic saints.

LIGU'RIA, one of the larger divisions (compartimenti) of Italy; area, 2055 sq. miles; pop. 1,077,473. It includes the towns of Genoa, Spezzia, and St. Remo, and is the most important maritime division.

LIGUS'TRUM. See Privet.

LILAC, a familiar fragrant-flowered shrub, 8-10 feet high. There are several varieties, the most common color of the flowers being lilac, but some are white.

LILITH, according to Rabbinical legends Adam's first wife, mother of giants and demons.

LILIUOKALANI (lê'le-oo'e-kâ-lä'ne), Lydia Kamekeha, Queen of the Hawaiian Islands, sister of King Kalakaua, whom she succeeded in 1891, was born in 1838. She secured the passage of bills authorizing the importation of opium and the establishment of the Louisiana lottery, and endeavored to substitute a reactionary constitution for the liberal one of 1887. This last measure aroused the white population of the islands, who would have been disfranchised under the proposed constitution, and on January 30, 1893, they deposed her and set up a provisional government which soon became a republic, with Sanford B. Dole at its head. The new government immediately sought to secure the annexation of the islands to the United States, but President Cleveland opposed this policy, and on the ground that United States forces had been used to dethrone the queen, demanded that the republican government restore her to power. This Dole and his advisors refused to do, and after a show of force, President Cleveland was compelled to acquiesce. The ex-queen visited the United States in order to plead her cause, and then retired to her private estate in Honolulu.

LILLE (lêl), a town of France, capital of the department Nord, and chief fortress of the northeast of France, near the Belgian frontier. Pop. 232,568.

LILY, a genus of plants, natural order Lilaceæ. The root is a scaly bulb; the leaves simple, scattered, or verticillate; the stem herbaceous, simple, and bearing at the summit very large and elegantly-formed flowers. The flower consists of six petaloid sepals, the calyx and corolla being alike in form and color. There are many species, the white, orange, and scarlet lilies, the tiger lily, etc. The common white lily is a native of Syria, Persia, and other eastern countries. The finest American species grow in marshes to the height of 6 or 8 feet, bearing reflexed orange flowers spotted with black. A well known Japanese lily is one of the noblest flowering plants in existence, and highly fragrant. It grows to the height of 12 feet. In the middle ages and in modern times the white lily has been the emblem of chastity, hence

the Virgin Mary is often represented with a lily in her hand or by her side.

LILY-OF-THE-VALLEY, a plant distinguished for its beautiful bell-shape flowers. It is found in Europe, Asia, and North America. The flowers, generally white, form a terminal unilateral raceme on a curved stalk; and their odor is agreeable.

LIMA, the capital of Peru, is situated at the foot of granitic hills, 7 miles from Callao, its port on the Pacific, on the small river Rimac. The climate is very agreeable, but the locality is subject to earthquakes, the most destructive being that of 1746. Lima was founded in 1535 by Pizzaro, and called Ciudad de los Reyes (City of the Kings). In January, 1881, Lima capitulated to the Chilians, who occupied it for upward of two years. Pop. estimated at 100,000.

LIMA, the capital of Allen co., Ohio, on the Ottawa river, and the Cin., Ham. and Dayton, the Erie, the Lake E. and W., and the Penn. railways; 130 miles n. by e. of Cincinnati. It is the center of the great Ohio petroleum and natural-gas fields, and since 1885, when petroleum was first discovered in the city, it has become one of the largest petroleum shipping-points in the country. Pop. 26,260.

LIMBOURG, or LIMBURG, a province of Belgium, separated by the Maas from Dutch Limburg; area, 931 sq. miles; pop. 220,658. Hasselt is the capital.

LIMBURG, a province of Holland, partly intersected by the Maas; area, 850 sq. miles; pop. 254,846.

LIME, the oxide of the metal calcium. This oxide, which in a state of combination is one of the most abundant bodies in nature, has been known and used from the remotest antiquity. The forms in which it occurs native are very numerous, but it does not exist in a pure state in nature, its affinity for carbonic acid being such, that it absorbs it from the atmosphere, when it becomes converted into carbonate of lime. Combined with carbonic, sulphuric, phosphoric and other acids it constitutes large rock masses, and even mountains; it is present in sea and other waters; it is a constituent of most soils and of a great number of minerals; and is essential to plants and animals.

Ordinary lime is obtained with most facility from the carbonate (see Limestone), from which by a strong heat the carbonic acid may be expelled. This process is conducted on a large scale with the different varieties of limestone, which are calcined or burned in order to obtain the caustic earth, or quicklime, as it is called. The lime thus obtained, however, is rarely pure enough for chemical purposes. Pure lime is a soft, white substance, of the specific gravity of 2.3. It is quite infusible, but when heated in the oxyhydrogen blowpipe it emits one of the intensest of artificial lights, and it has accordingly been employed for a signal light and for facilitating the observation of distant stations in geodetical operations. It is soluble in about 700 parts of cold water. The solubility is diminished by heat. If a little water be sprinkled on new burned lime it is rapidly absorbed, with the evolution of much heat and vapor. This

constitutes the phenomenon of slacking. The heat proceeds from the combination of the water with the lime, forming a hydrate, as the slacked lime is called. This is a compound of 56 parts of lime with 18 of water, or rather more than 3 to 1. The water may be expelled by a red heat. Lime-water is astringent and somewhat acrid to the taste. It renders vegetable blues green, and yellows brown; and restores to reddened litmus its usual purple color. Lime, submitted to the action of galvanism in high intensity, afforded Sir H. Davy satisfactory evidence that, in common with the other earths, it consists of a metal, which he denominated calicum, and oxygen, the proportions being 72 of calcium and 28 of oxygen. (See Calcium.) Chlorine combines directly with lime, forming the very important substance used in bleaching, called chloride of lime or bleaching-powder. It is formed by passing chlorine gas over slacked lime. Chloride of lime is also used as a disinfectant.

The uses of lime are almost too numerous to mention, for there is hardly any operation in the arts for which lime is not at some part indispensable. In the manufacture of basic Bessemer steel (see Steel) it forms about one-half of what is called "Thomas slag," which, when ground, makes a cheap and efficient fertilizer; it is employed in the early stages of leather dressing to remove hair, fat, etc., from the hides; it is used in metallurgy as a flux; in soap-boiling to causticize the alkaline liquors; in the manufacture of washing soda; for neutralizing acids; for making mortars and cements; in agriculture to destroy inert or noxious vegetable matter, and to decompose heavy clay soils; and in the materia medica, chiefly as an antacid.

LIME, or **LINDEN**, a large tree, with alternate, simple, and cordate leaves, and sweet-scented flowers, disposed on a common peduncle. The common linden is a well-known tree. The inner bark of all the species is very tenacious; it is called bast, and mats are made of it in Russia in large quantities. The wood is rather soft, close-grained, and much used by turners. The American lime, or bass-wood is a large and beautiful tree, resembling the European species.

LIME, a small globular shaped lemon, the fruit of a shrub about 8 feet high. It is a native of India and China, but was introduced into Europe long before the orange, and is now extensively cultivated in the south of Europe, the West Indies, and some parts of Southern America. The fruit is agreeably acid, and its juice is employed in the production of citric acid, in beverages, etc.

LIME LIGHT. See Oxyhydrogen Light.

LIMERICK, a city of Ireland, capital of Limerick county, and a county of itself, is situated at the interior extremity of the estuary of the Shannon. The industries include the curing of bacon, the preparation of butterine, flax spinning and weaving, and lace-making. Pop. 38,085.—The county belongs to the province of Munster, area, 680,842 acres, of which one-fourth is under tillage. Pop. 146,018.

LIMESTONE, a species of mineral

comprising numerous varieties of carbonate of lime, differing considerably in external appearance, structure, and composition. It is, if pure, essentially composed of 57 parts of lime and 43 of carbonic acid; but in some rocks the limestone is intermixed with magnesia, alumina, silica, iron, etc. All limestones give readily to the knife. They are infusible; but when impure, by an admixture with a portion of other earths, they vitrify in burning. All limestones effervesce when a drop of strong acid is applied on the surface, and they dissolve entirely in nitric or hydrochloric acid. Limestone is found both in primary and in secondary rocks, but most abundantly in the last. It is also not uncommon in alluvial deposits, when it is called calcareous tufa. Limestone has frequently a granular structure; and the size of the grains is variable, in some degree corresponding with the relative age of the mineral. Thus limestone which occurs in beds in gneiss, has usually a coarse texture, and large granular concretions; but when its beds exist in mica slate, or argillite, its texture becomes more finely grained, and its color less uniform. Silurian and Devonian limestones have a texture more or less compact; the colors are often variegated; and they often contain fossils. Secondary limestone has a compact texture, a dull fracture, and usually contains shells, and sometimes other organic remains. It is always stratified. Compact limestone passes into chalk when the particles are somewhat loosely connected with each other, so that the whole assumes an earthy character. A variety of very fine-grained compact limestone is used in lithography the best being that obtained near Pappenheim and Solenhofen in Bavaria.

LIMITATION, in English law, a certain time, assigned by statute, within which an action must be brought, varying according to the subject of action. This matter is regulated by certain acts of parliament, called Statutes of Limitations. According to those now in force, actions are limited as follows:—Actions for the recovery of land, rent-charge, or redemption of mortgages, to 12 years after right accrued; of debt or covenant, if founded on a deed, to 20 years, on less formal agreement, to 6 years after breach; bills, promissory notes, trade accounts, arrears of rent or dower, to 6 years. In the case of persons under disabilities, as infancy, coverture, idiocy, lunacy, or absence beyond seas, the action may be brought within 12 years of its accruing, or within 6 years of the disability ending or the disabled person dying, but in no case does the limit allowed exceed 30 years. Actions for slander are barred after 2 years; actions on penal statutes, if brought by the party injured after 2 years, if brought by a common informer after 1 year. Actions by the crown are limited to 60 years. An action for assault, battery, etc., must be brought within 4 years, an action for death by accident within 1 year. In a charge of murder the injured person must have died within a year and a day of the time when the injury was inflicted. These limitations do not apply to prosecutions for crime, or for

breach of trust on the part of trustees, these may be instituted at any time. The American law is mainly based on the English statutes.

LIMOGES (li-mōzh), a town of Western France, capital of the department of Haute-Vienne, and former capital of Limousin. The principal industry is the manufacture of artistic porcelain, known as Limoges ware, and employing over 6000 hands. Pop. 83,569.

LI'MONITE, a very important ore of iron, varieties of which are bog iron ore and brown hæmatite. It is a hydrated oxide of a brownish color, occurring in mammillated or botryoidal masses, and found in various parts of England, and abundantly on the Continent and in America.

LINA'CEÆ, the flax family, a small natural order of exogenous plants, scattered more or less over most parts of the globe, those in temperate and southern regions being herbs, while the tropical representatives are trees or shrubs. They are principally characterized by their regular flowers, with imbricate glandular sepals having a disc of five glands outside the staminal tube; the ovary is three to five celled, with two ovules in each cell; the albumen is fleshy; the leaves are simple, usually stipulate, rarely opposite. The tenacity of the fibre and the mucilage of the diuretic seeds of certain species of the common flax are well known.

LINCOLN (ling'kon), a city of England and a county in itself, capital of Lincolnshire, 120 miles north of London, situated on the Witham, and at the junction of several railways. Pop. 48,783.—Lincolnshire is a large maritime county on the east coast, bounded by the Humber, the German Ocean, and the Wash, and by the counties of Cambridge, Northampton, Rutland, Leicesters, Nottingham, and York; area, 1,767,879 acres. Pop. 498,781.

LINCOLN, capital of Nebraska, on the right bank of Salt Creek, a tributary of the river Platte. The public buildings include the United States revenue offices,



State capitol, Lincoln, Neb.

court-house, and post-office, in one building; state-house, university, schools and churches. It has a large trade in all kinds of merchandise, grain, live-stock, and lumber. Pop. 48,169.

LINCOLN, Abraham, the sixteenth president of the United States of America, born in Kentucky 1809. He removed

with his family in 1816 to Spencer co., Indiana, and for the next ten years was engaged in laborious work of various kinds, having only about a year's schooling at intervals. On the breaking out of the Black Hawk war in 1832 he joined a volunteer company, and as captain he served three months in the campaign. He next opened a country store, was appointed postmaster of New Salem, Illinois, began to study law, and at the same time turned amateur land-surveyor. In 1834 he was elected a member of the Illinois legislature, to which he was again returned at the three following biennial elections, and in 1836 he was licensed to practice law. In 1846 he was elected a representative in congress for the central district of Illinois, and voted steadily in congress with the anti-slavery party. In 1849 and again in 1858 he was unsuccessful in attempts to enter the senate. In the republican national convention held at Chicago in May, 1860, he was nominated as a candidate for the presidency, and after several votes he gained a majority, and was eventually chosen unanimously. The Southern states, exasperated at this defeat, and alarmed at the aggressive anti-slavery policy which many of the

pouring in fresh troops after every disaster finally enabled the federal government to subdue the secession. The toleration of slavery was always, in Lincoln's opinion, an unhappy necessity; and when the southern states had by their rebellion forfeited all claim to the protection of their peculiar institution, it was an easy transition from this view to its withdrawal. The successive stages by which this was effected—the emancipation of the slaves of rebels, and the offer of compensation for voluntary emancipation, followed by the constitutional amendment and unconditional emancipation without compensation—were only the natural steps by which a change involving consequences of such vast extent was reached. The determination of the northern states to pursue the war to its conclusion on the original issue led to the re-election of Lincoln as president in 1864. The decisive victory of Grant over Lee on 2d April, 1865, speedily followed by the surrender of the latter, had just afforded the prospect of an immediate termination of this long struggle, when, on the 14th of the same month, President Lincoln was shot in Ford's Theater, Washington, by an assassin named John Wilkes Booth, and expired on the following day. In the affections of the Americans Lincoln holds a place second only to Washington.

LINCOLN'S INN. See Inns of Court.

LINCOLN, Robert Todd, American politician, son of Abraham Lincoln, born at Springfield, Ill., in 1843. At the close of the civil war he settled in Chicago, and practiced law until 1881, when he entered Garfield's cabinet as secretary of war. He was retained in this position by President Arthur, and in 1884 was mentioned for the presidential candidacy, but refused to oppose Arthur in the convention. From 1889 to 1893 he was minister of the United States to Great Britain. He was counsel for the Pullman Palace Car Company, and after the death of George M. Pullman became its president.

LINCROSTA-WALTON, an embossed wall-covering, designed as a substitute for wall-papers, natural woods, or plaster modeling. The material consists of linseed oil with which is mixed wood-fibre, cork, cellulose, paper, or other thickening substance. The mixture after being treated chemically is made into sheets, which are then backed with light canvas and stamped in an ornamental pattern. It is waterproof, warm, and washable. The original color is light brown or gray, but when mounted on the wall it may be painted, bronzed, or gilt. The figures may be stamped in high relief with striking effect. Lincrosta is really a variety of linoleum.

LIND, Jenny (Madame Otto Goldschmid), singer, born in Stockholm 1820, died 1887. She received part of her musical training under Garcia at Paris; achieved her first success in Berlin in 1845, and subsequently was received with a great ovation in her native city of Stockholm. She made her first appearance in London at Covent Garden in 1847 before an enthusiastic audience; went to the United States, where she married Herr Goldschmid in 1852; re-

turned to Europe and made an extensive tour, finally settling in England. In recent years she seldom came before the public, but as professor in the Royal Academy of Music, and as trainer of the female voices in the Bach choir conducted by her husband, her talents were not lost.

LINDEN, a handsome forest tree. See Lime.

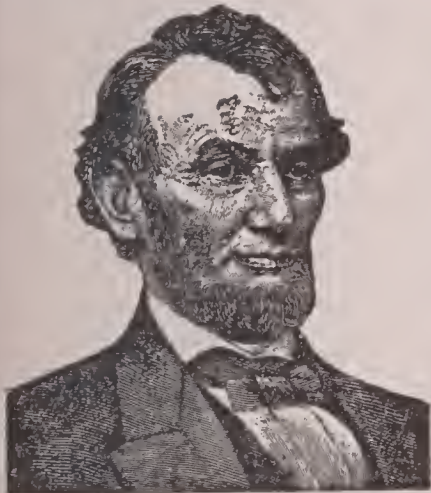
LINEN, cloth made of flax, has had a very ancient and extensive use. On the early monuments of Egypt artistic representations of the various processes of linen manufacture have been found, and the fine linen fabric in which the Egyptians wrapped their embalmed dead still gives evidence of the skill which they possessed. The Jews took with them into Canaan a knowledge of the manufacture; Tyre, Sidon, and Carthage seem also to have acquired the industry; while at an early period the manufacture of linen appears to have been common in Greece and Rome. In the middle ages linen and woolen were the chief articles of dress in all European countries, and among the Flemings in particular the flax manufacture rose to great importance. The linen manufacture has been known in England, Ireland, and Scotland for a long period. As early as the 7th century the Anglo-Saxon women were skilled in the weaving of this fabric, and fine linen was made in Wilts and Sussex in the 13th century. Since the extensive introduction of cotton, however, the linen industry has decreased in relative importance, this result having come about mainly within the present century. The chief center of the manufacture in England is Leeds and neighborhood. In Ireland the manufacture of linen was well established in the 17th century; subsequently it declined; but lately it has again obtained a flourishing position, Belfast being the center of the manufacture. Dundee is the chief center in Scotland for lincn (especially coarse fabrics) as well as the allied jute manufacture. Dunfermline is celebrated for its table linens. The machinery used both in spinning and weaving linen is in general, with the exception of some special adaptations, the same as that used for cotton. (See Cotton Spinning and Weaving, also Flax.) The chief varieties of linen now manufactured are: lawn, which is of fine quality and mostly produced in Ireland; plain cloths for shirtings, bedding, etc.; damasks, table-cloths, and other ornamental fabrics; and cambric, which is the finest of all linen fabrics.

LING, a species of sea-fish allied to the cod family, and measuring from 3 to 4 feet in length. It abounds around the British coasts, and is caught with hook



Ling.

and line, and preserved in immense quantities in a dried state. From the beginning of February to May the ling is in highest perfection; the spawning season commencing in June.



Abraham Lincoln.

leading republicans had proclaimed their determination to follow, refused to acquiesce in Lincoln's election, and began one after another to announce their secession, and to organize the means of resisting the enforcement of the claims of the central government. The election of Lincoln took place in November, 1860, and he assumed office on the 4th of March, 1861. It was the intention of Lincoln to use every means of conciliation consistent with the policy he deemed it essential to the national interest to pursue. On one point, however, his resolution was steadfast, to admit no secession, and before his assumption of office secession was as resolutely determined on on the other side. On the 4th of February the southern confederacy had been constituted, and on the 14th of April the first blow in the civil war was struck by the capture of Fort Sumter by the confederates. The events of the civil war during the next four years in Lincoln's career belong to the history of the United States. Lincoln's persistence in raising and

LINGARD, John, an English historian, born at Winchester 1771; died at Hornby 1851. His *Antiquities of the Anglo-Saxon Church* appeared in 1858, and his great work on *The History of England from the Invasion of the Romans to the year 1688* was first printed in 1819-25, and reached a fifth edition in 1850. Lingard's History is considered a standard work from the Roman Catholic stand-point.

LIN'IMENT, in medicine, a species of soft ointment of a consistence somewhat thinner than an unguent, but thicker than oil. The term is also applied to spirituous and other stimulating applications for external use.

LINK, in land-measuring, a division of Gunter's chain, having a length of 7.92 inches. The chain is divided into 100 links, and is 66 feet in length. 100,000 square links make an imperial acre.

LINLITH'GOW, a royal and parliamentary burgh of Scotland, capital of Linlithgowshire, 17 miles west of Edinburgh. Pop. 4279.—The county of Linlithgow, or West Lothian, is bounded by the Firth of Forth, Edinburghshire, Stirling, and Lanark; area, 76,806 acres. This county is one of the richest in Scotland in minerals, including coal, shales, ironstone, freestone, limestone. Pop. 65,699.

LINNÆ'A, a genus of plants of the natural order Caprifoliaceæ (honeysuckles). It contains but one species, a creeping evergreen plant found in woods and in mountainous places in Scotland and other northern countries, including North America as far south as Maryland, bearing two beautiful drooping fragrant bell-shaped pink flowers on each flower-stalk.

LINNÆAN SOCIETY, a society in London, instituted in 1788 by Dr. (afterward Sir) J. E. Smith, and incorporated in 1802, for the promotion of the study of all departments of botany and zoology. It has an excellent library, a museum, and herbarium, the nucleus of which were formed by the collection of Linnæus himself. Fellows take the initials F.L.S.

LINNÆ'US. See next article.

LINNE' (lin'nā), Karl von, commonly called Linnæus, the greatest botanist of his age, was born at Rashult, Sweden, 1707, and died at Upsala in 1778. Aided by the Academy of Sciences at Upsala Linné made a journey through Lapland, the result of which was shown in his *Flora Lapponica*, published 1735. In this year he went to the University of Harderwyk in Holland and took an M.D. degree; afterward visited Leyden, where he published the first sketch of his *Systema Naturæ* and *Fundamenta Botanica*. In 1736 he visited England, went to Paris in 1738, and afterward settled in Stockholm as a physician. He became professor of medicine at Upsala in 1741, and then of botany and natural history; was made a knight of the Polar Star with the rank of nobility; and died on his estate near Upsala from apoplexy. The great merit of Linné as a botanist was that he arranged plants on a simple system of sexual relationship and prepared the way for the more natural and satisfactory classification which has superseded the Linnæan system.

LINNET, a small singing bird of the

finch family. Its general plumage is brownish, the top of the head and breast being reddish in the breeding season.



Linnet.

They are cheerful and lively birds, and very sweet and pleasing songsters.

LINO'LEUM, a preparation of linseed-oil with chloride of sulphur, by which it is rendered solid and useful in many ways. When rolled into sheets it is used as a substitute for india-rubber or gutta-percha; dissolved it is used as a varnish for waterproof textile fabrics, table-covers, felt carpets, and the like; as a paint it is useful both for iron and wood, and for ships' bottoms; as a cement it possesses some of the qualities of glue; vulcanized or rendered hard by heat it may be carved and polished like wood for mouldings, knife-handles, etc.; and mixed with ground cork and pressed upon canvas it forms floor-cloth.

LIN'OTYPE, a recently-invented printing-machine, in which types are discarded, and matrices used instead, these being brought to the proper places by touching corresponding keys, the rows of matrices being then automatically filled with molten metal so as to produce solid bars or lines of type, and then automatically returned to their places. The linotype is used almost exclusively in newspaper and magazine work and for the cheaper grades of book work.

LINSEED-OIL, the oil got from the seeds of flax either by pressure in the cold or by heating to about 200° Fahr. It is of a pale to dark yellow color; may or may not have a smell, and remains liquid even at zero Fahr. Linseed-oil is largely used in the arts, for painting, for printer's-ink, etc.; and in medicine, especially for burns. Linseed-cake is the solid mass or cake which remains when oil is expressed from flax-seed. It is much used as food for cattle and sheep, and is called also oil-cake.

LINT, in surgery, is the scrapings of fine linen, used by surgeons in dressing wounds. Lint made up in an oval or orbicular form is called a pledget; if in a cylindrical form, or in shape of a date or olive stone, it is called a dossil.

LION, a quadruped of the cat genus, the most majestic of all carnivorous animals, distinguished by its tawny or yellow color, a full flowing mane in the male, and a tufted tail with a sort of sharp nail at the end of it. The largest lions are from 8 to 9 feet in length. The period of gestation is five months; one brood is produced annually, with from

two to four at a birth, and the mother nourishes the whelps for about a year. The mane of the male lion begins to grow when it is three years old; the adult age is reached about six or seven; and the extreme age is about twenty-two, although authorities differ from this estimate. The lion is a native of Africa and parts of Western and Central Asia. He preys chiefly in the night and on live animals, avoiding carrion, unless impelled by intense hunger. He approaches his prey with a stealthy pace, crouching when at a proper distance, when he springs upon it with fearful velocity and force. The whole frame is extremely muscular, the foreparts being particularly so, giving with the large head, flashing eye, and copious mane, a noble appearance to the animal, which has led to his being called the "king of beasts," and to fancies of its noble and generous nature which have no real



Head of maneless lion.

foundation. Of the African lion there are several varieties, as the Barbary lion, Gambian lion, Cape lion. The Asiatic varieties are generally smaller and may want the mane, as the maneless



Head of Gambian lion.

lion of Gujerat. The American lion is the puma.

LIPPE (lip'pè), or incorrectly Lippe-Detmold, a principality of north Germany, bounded chiefly by Rhenish Prussia and Wanoer; area, 438 sq. miles. Pop. 139,238.

LIQUATION, or **ELIQUATION**, the process of separating by a regulated heat an easily fusible metal from an alloy in which is a metal difficult to fusion. Thus in the refining of tin to remove slag, iron, copper, and other metals, the ingots are heated in a reverberatory furnace to a temperature just sufficient to melt the tin, which is allowed to run into a basin, while the impurities are left behind on the hearth.

LIQUEUR (li-keur'; the French name), a palatable spirituous drink composed of water, alcohol, sugar, and an aromatic infusion, extracted from fruits, seeds, etc. The best-known liqueurs are absinthe, anisette, chartreuse, curaçoa, maraschino kummel, and noyau.

LISBON, the capital and principal seaport of Portugal, on the right bank of the Tagus, about 9 miles above its mouth. The western quarter of the city, called Buenos Ayres, is airy and pleasant and chiefly occupied by foreigners. The town of Belem, still farther to the west, forms a sort of suburb to Lisbon. Above it stands the royal palace of Ajuda, a conspicuous edifice of white marble. Among the chief buildings are the castle of St. George or citadel, the cathedral, the church do Coração de Jesus, the custom-house and other government buildings on the Praça do Commercio, the town-hall, etc. But the most remarkable specimen of architecture of



LISZT, Abbé Franz, distinguished pianist and composer, was born in Hungary in 1811, and died in 1886. He made his first public appearance in his ninth year; studied in Vienna and Paris; produced an opera in 1825, and became director of the Court Theater at Weimar in 1849. This gave him the opportunity to introduce the music of Wagner, Berlioz, Schuman, and the writers of what

There are various styles in which drawings on the stone are executed. Drawing on the smooth stone is executed with steel pens and sable-hair brushes. The design, etc., is drawn on the stone in reverse, after which it is slightly etched with dilute acid. In chalk drawing the surface of the stone is roughed or grained, after which the drawing is traced upon the stone. The tinting or shading follows. When completed the drawing is etched, after which it is put into the hands of the printer for printing. In engraving on stone the stone is first prepared with a solution of acid and gum. It is then washed with water, and a dry red or

LITHUA'NIA, a region in eastern Europe which formed a grand-duchy in the 11th century; became united to Poland in the 14th century; and at the dismemberment of that kingdom, in 1773-95, was nearly all appropriated by Russia, now forming the governments

of Mohilev, Vitepsk, Minsk, Vilna, and Grodno; area about 100,000 sq. miles, of which 6700 are in Prussia. The Lithuanians are a race of people closely akin to the Letts. They are fair-haired, blue-eyed, and light-skinned; of mild disposition, and chiefly occupied in agriculture. Their language is akin to the Lettic and Old Prussian, and forms with these the Lithuanian or Lettic branch of the Aryan family of tongues. Their literature consists chiefly of popular songs and hymns, religious works, tales, etc.

LITRE, the French standard measure of capacity in the decimal system. The litre is a cubic decimetre; that is, a cube, each of the sides of which is 3.937 English inches; it contains 60,028 English cubic inches; the English imperial gallon is equal to fully $4\frac{1}{4}$ litres, or more exactly 4.54345797 litres.

LITTLE FALLS, a city in Herkimer co., N. Y., 21 miles east by south of Utica, on the Mohawk river, the Erie Canal, and the New York Central and Hudson rivers and the West Shore railroads. Pop. 12,160.

LITTLE ROCK, the largest city in and capital of Arkansas, on the right bank of the Arkansas, here navigable, 250 miles from its mouth. It stands on a rocky bluff, rising about 50 feet above the river. It has the usual variety of churches, a state-house, court-house, jail, theater, military college, etc. Pop. 1909, 60,000.

LITURGY, a special series of prayers, hymns, pieces of Scripture, or other devotional matter, arranged and prescribed for use in worship; or in a narrower sense a prescribed service for the celebration of the eucharist; hence in the Roman Catholic Church equivalent to the mass or service contained in the Missal. There are a number of ancient liturgies connected with various places or names of various persons, but there seems to have been no written liturgy earlier than the 5th century. The chief liturgical books in the Roman Catholic Church are the Missal and the Breviary, both in Latin. The English Book of Common Prayer dates from the reign of Edward VI. (See Common Prayer.) It was based on the Roman Breviary. In the portions of Scripture contained in the prayer book the authorized version was latterly adopted, except in the Psalms, which are according to Coverdale's Bible. The liturgy of the Episcopal Church in Scotland is the same as that of the Church of England, except that there is a different communion office, which, however, is used only in some of the Scotch churches. The Kirk of Scotland, or the Scotch Presbyterian Church, has no liturgy, the Directory for the Public Worship of God being only certain general rules for the conduct of public worship. The Book of Common Prayer of the Protestant Episcopal Church in the United States was adopted in 1789 with some minor deviations from the English.

LIUTPRAND, or **LUITPRAND**, historian, prelate, and diplomatist, was born at Pavia about 920, and died at Cremona about 972. Besides an interesting narrative of a mission to Constantinople, he has left us a History of Otto; and his Antapodosis, a history of Europe

in six books, from 886 to 950. These works are the chief historical authority for that period.

LIVER, the glandular structure, which secretes the bile. This gland is not confined to the Vertebrate animals, all of which—save the Amphioxus or lancelet—possess a well-developed liver, but is found in many Invertebrata. In man the liver is part of the alimentary apparatus, and is situated just below the diaphragm on the right side, extending across the middle line of the body toward the left side. Its front border reaches just below the border of the chest when the posture is sitting or standing; but when the person lies down the liver passes slightly up so as to be completely under cover of the ribs, except a small portion which extends beyond the lower end of the breast-bone. From its position it is extremely liable to compression and injury. It is the largest gland in the body, and weighs from 50 to 60 ounces avoirdupois. In its general form the liver is flat, broad, and thick toward the right side, becoming narrow and thin toward the left side. Its upper surface is convex or arched and fits into the concave surface of the diaphragm, while its lower surface is irregularly divided into certain "lobes," five in number, and separated by clefts or fissures. These lobes are known as the right, left, spegelian, caudatus and quadrate lobes.

When microscopically examined the entire mass of the liver is found to consist mainly of large many-sided cells containing granular protoplasm. They are arranged in groups or masses, each little mass being called a lobule, and each lobule slightly mapped off by connective tissue and containing a meshwork of blood-vessels and ducts. These blood-vessels are branches of the portal vein. This vein receives the blood which has circulated in the stomach and intestines and carries it throughout the entire liver by a net-work of finely subdivided veins. It is from this supply of blood that the bile is secreted. The blood passes off from the liver by the hepatic vein, formed by the union of small vessels which begin in the center of the lobules. The connective tissue of the liver is supplied with arterial blood by the hepatic artery. This blood, like that which has entered through the portal vein, is drained off into the hepatic vein. There is, however, another set of vessels which ramify through the liver, namely the bile ducts, whose business it is to carry off the bile produced in the gland. These ducts intersect and unite until in the end two channels are formed, one from the right and the other from the left of the liver, which ultimately form one common exit into the small intestine called the common bile duct. Thus, when the bile has been secreted by the liver-cells, it is transferred by way of this hepatic duct into the small intestine, where it mingles with the food. When this flow of bile ceases, as it does when intestinal digestion is interrupted, the supply which still continues is stored in the gall-bladder, which forms a kind of reservoir situated under the liver.

The functions of the liver would seem to be, at least, threefold. It serves (1)

to secrete from the blood received from the stomach and intestines that amount of bile which is necessary for the purposes of digestion. The bile, however, contains waste matter, which has been separated from the blood. The liver therefore (2) has a direct function in separating and casting forth the waste impurities of the blood. Further, it appears from recent investigation that (3) the liver secretes a substance which is called glycogen or animal starch. The use of this substance, which is readily converted into sugar, would seem to be to supply the tissues with material for their energy and heat. The functions of the liver, however, still form the subject of dispute and investigation among physiologists. See Bile and Gall-bladder.

There are many diseases connected with this important gland. There is congestion of the liver, which indicates that the structure is surcharged and choked with blood. This arises from various causes; heart disease, disease of the lungs, or even excess in food or drink will produce congestion. The symptoms are excessive weight, fulness, and a tenderness in the organ which may be proved by a slight push in the region beyond the breast-bone. Inflammation of the liver is frequent in hot countries; is closely connected with dysentery, and its symptoms are similar to those connected with congestion. Cirrhosis of the liver or drunkard's liver is frequently caused by excessive spirit-drinking—but not necessarily so, as it has been known to occur in children. The symptoms are many and not easily recognized; and the disease may remain for years before a fatal issue. Fatty degeneration of the liver occurs when the cells become crowded with globules of oil, and it becomes large and pale. This result usually arises from over-feeding or drinking and want of exercise. See Jaundice.

LIVERPOOL, an episcopal city, parl., county, and municipal borough, and seaport of England, county of Lancaster, on the right bank of the Mersey, about 4 miles from its confluence with the Irish Sea, 185 miles northwest from London. The chief public buildings are the town hall, municipal offices, revenue buildings, St. George's hall, exchange, public library and museum, art gallery, Picton reading-room, the Wellington rooms, government offices, and law courts. The free public library and museum accommodate a central technical school, while one portion is occupied by the reference library of 120,000 volumes, and another section by the museum. Near the library is a gallery of art for the unrestricted use of the people. There are altogether upward of 300 places of worship in Liverpool, and many of the churches and chapels are very handsome buildings. When Liverpool was constituted a bishop's see in 1880, the parish church of St. Peter was made the cathedral. The charitable and benevolent institutions, such as hospitals, and infirmaries, etc., are numerous. The educational institutions include University College (affiliated to the Victoria University, Manchester), Liverpool College, the Royal Institution, the Liverpool Institute, School of Art and

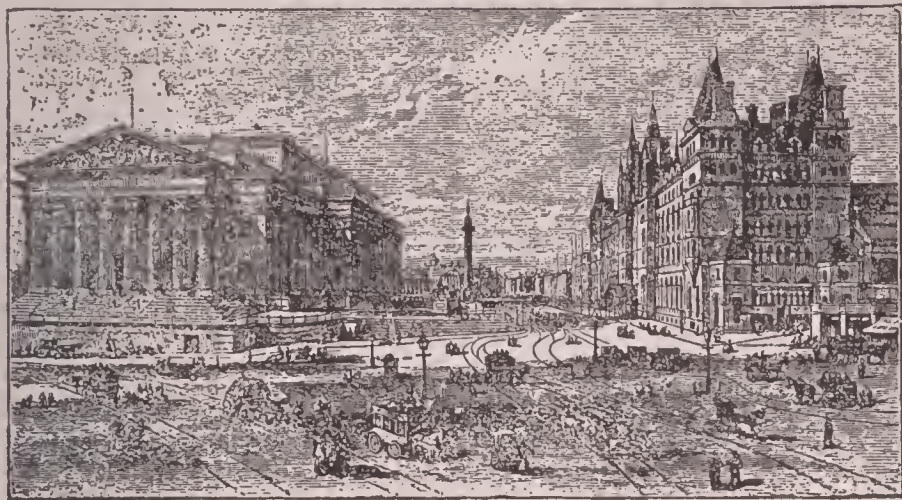
Gallery of Art, etc. Next to London it is the chief seaport in the United Kingdom, or indeed in the world. Among the imports cotton holds the chief place, followed by provisions and live-stock, cereals, fruits, hides, palm and olive-oil, wine and spirits, tobacco, etc. Cotton goods form by far the principal export; other exports are machinery, woollens,

Blantyre, where David became a "piecer" at the age of ten. While at work in the mill he learned Latin and read extensively, and having attended the medical and Greek classes at Glasgow University during the winter months, he finally became a licentiate of the Faculty of Physicians and Surgeons of Glasgow. Under the auspices

in the lake region of South Africa, especially to the westward of Nyassa and Tanganyika, where he discovered Lakes Bangweolo and Moero, the Upper Congo, etc. For about three years no communication had come from him, and the doubts regarding the traveler's safety were only set at rest when it was known that H. M. Stanley, the special correspondent of the New York Herald, had seen and assisted Livingstone at Ujiji, on Lake Tanganyika. They parted in March, 1872, Livingstone going to explore the southern end of Tanganyika, and Stanley proceeding to Zanzibar. After another year's wanderings he was attacked with dysentery near Lake Bangweolo, and there he died. His body was buried in Westminster Abbey, having been conveyed to the coast, rudely preserved in salt, by his faithful followers.

LIVINGSTON, Edward, American jurist and statesman, was born in 1764, at Clermont, Columbia co., N. Y. From 1795 to 1801 he was a member of congress. In 1801 he was appointed United States attorney for the district of New York, and during the same year was elected mayor of the city of New York. In December, 1803, he sailed for New Orleans, and early in 1804 became a member of the bar there. During the second war with Great Britain he served for a time as secretary and confidential adviser to General Jackson. In 1820 he was elected to the lower house of the Louisiana legislature, and with two other members was commissioned to prepare a civil code for the state. In 1822 he was elected to congress. He was twice reelected, serving until 1829, when he was transferred to the United States senate, where he took high rank. In 1831 President Jackson appointed him secretary of state, and in 1833 sent him as minister plenipotentiary to France to demand the payment by the French government of an indemnity of a million sterling on account of depredations upon American commerce. He was entirely successful. He died in 1836.

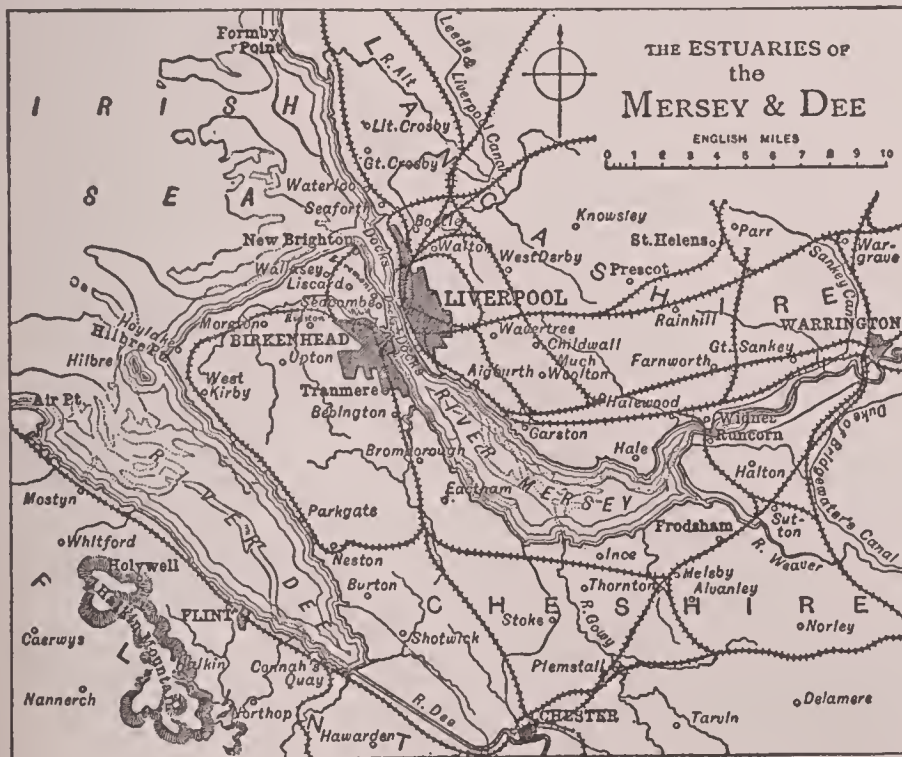
LIVINGSTON, Robert R., American



St. George's Hall and Lime street station, Liverpool.

etc. Manufacturing industries are varied, and include engineering, iron- and brass-founding, chemicals, sugar-refining, brewing, rope-making, etc. Liverpool is the chief port in Britain for the departure of emigrants. There are five approaches to the town by railway, and by the opening of the tunnel under the Mersey the railway facilities have been

of the London Missionary Society he proceeded in 1840 to South Africa, where he joined Robert Moffat in the missionary field. His first station was in the Bechuana territory, and here his labors for nine years were associated with Mr. Moffat, whose daughter he married. Having heard from the natives that there was a large lake north of the



Robert R. Livingston

jurist and statesman, was born in 1746; In 1776 he became a member of the

materially increased. Liverpool is, next to London, the largest town in England. Pop. 685,276.

LIVINGSTONE, David, missionary and African traveler, was born at Blantyre, Lanarkshire, 1813, and died near Lake Bangweolo, Africa, 1st May, 1873. His parents had settled in the neighborhood of the cotton mills near

Kalahari desert, he proceeded to explore that region, and discovered the valley of the Zouga and Lake Ngami. After making various journeys and exploring the Lake Nyassa and Zambesi region, Livingstone set forth in 1865 to set at rest the question of the sources of the Nile. From this time till his death he was engaged in laborious explorations

continental congress, and served on the committee which was appointed to draw up the Declaration of Independence. He was a member of the committee which drafted the constitution for the State of New York in 1777, and upon its adoption became the first chancellor of the state. It was in this capacity that he administered the oath of office to Washington, on the occasion of his first inauguration to the presidency, in New York City. In 1794 President Washington tendered him the post of Minister to France, which he declined; but in 1801, upon receiving a second tender of the same office, he accepted, and began the negotiations for the purchase of Louisiana, which, after the arrival of Monroe was carried to a successful conclusion. He died in 1813.

LIV'US, Titus, Patavinus, often called Livy, a celebrated Roman historian, born at Patavium (Padua) in the year 59 B.C. Nothing is known of his life except that he came to Rome, secured the favor of Augustus, and became a person of some consequence at court, that he was married, and had at least two children, and that he died in his native town, according to some authorities, A.D. 11, and to others, A.D. 16 or 17. His Roman history begins at the landing of Æneas in Italy, and comes down to the year of the city 744 (B.C. 9). His whole work consisted of 140 or 142 books, of which we have remaining only the first ten, and those from the twenty-first to the forty-fifth, or the first, third, and fourth decades, and half of the fifth. Of all the books, however, except two, we possess short epitomes or tables of contents. In the first ten books the history extends from the foundation of Rome B.C. 753 to the year 294 B.C.; the portion between the twenty-first and forty-fifth books contains the account of the second Punic war and the history of the city between B.C. 219 and 201. The fourth and the half of the fifth decade bring down the history to the year B.C. 167. Livy makes no pretensions to the character of a critical historian; his grand purpose was to glorify his country, and he adopted all the legends of the early history without troubling his mind about their authenticity.

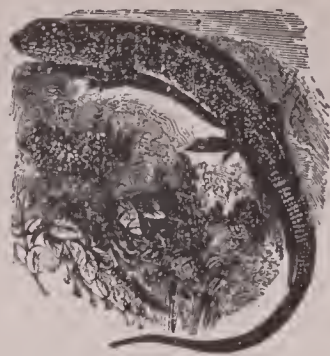
LIVO'NIA, or **RIGA**, a government of Russia, including the island of Oesel, bounded west by the Baltic; area, 17,609 sq. miles. The inhabitants are almost all Protestants. The capital is Riga. Pop. 1,207,887.

LIVRA (lē-vr), an old French money of account, not now in use, having been superseded by the franc.

LIVY. See Livius.

LIZARD is the popular name of numerous reptiles having usually two pair of limbs and an elongated body terminating in a tail. The lizards number more than a thousand species, accommodating themselves to all conditions except cold, and increasing in size and number in tropical regions. In some the tongue is thick and fleshy and in others it is divided, while in most cases it is protrusible. Some lizards are vegetable feeders, but for the most part they are carnivorous and live upon small birds, insects, etc. The eggs are

deposited and left to be hatched without care from the parents.



Nimble lizard.

LLAMA (lá'ma or lyä'má), an ungulate ruminating quadruped found in South America, closely allied to the camel, and included in the family Tylopoda. They differ from the camel in having no hump upon the back, in having a deeper cleft between the toes, the callous pad of the foot is less developed, and the interval between the canine and the back teeth is greater. The tail being short and the hair long and thick, the llama has the general appearance of a long-necked sheep,



Llama.

standing about 3 feet at the shoulder. Of the four known species the guanaco and the vicuña are found in a wild condition, while the llama and the alpaca have long been domesticated. The llama is used by the inhabitants of Chile and Peru to carry burdens after the manner of a camel. When loaded with about a hundredweight it can travel some 14 miles a day across the mountain passes. They are gentle and docile creatures.

LLANOS (lyä'nōs), the Spanish name given to the vast plains situated in the north part of South America, particularly in Colombia and the basin of the Orinoco. During the dry season the vegetation is burned up by the sun, while in the rainy period they are flooded with water. Between these two seasons the llanos are covered with thick grass and ranged by vast herds of cattle and horses. Farther south such plains are called pampas, and in North America savannahs.

LLANQUIHUE (lyän-kē'wā), a southern province of Chile, situated between the Andes and the Pacific Ocean. Its area of nearly 8000 sq. miles is extremely fertile, yielding abundant harvests to its inhabitants, who are mostly Germans; capital, Puerto Montt. Pop. 91,000.

LLOYD, Henry Demarest, American author, born in New York City in 1847. From 1872 to 1885 he was connected with the Tribune of Chicago. He also held the secretaryship of the American Free Trade League. The first of his publications was *A Strike of Millionaires Against Miner*. His *Wealth Against Commonwealth* is an examination of the methods of the Standard Oil Company. His other works are: *Labor Co-partnership*, *Notes of a Visit to Coöperative Workshops, Factories and Farms in Great Britain and Ireland* (1898); *Newest England*; *Notes of a Democratic Traveller in New Zealand*; and *A Country Without Strikes*; *A Visit to the Compulsory Arbitration Court of New Zealand*. He died in 1903.

LLOYD'S, an incorporated society of persons engaged in marine insurance in London, or otherwise connected with shipping, having rooms in the London Royal Exchange. Members are admitted by subscription, and the affairs of the institution are conducted by a committee. Reports are received daily from all foreign ports, and this information is posted in the common or merchants' room. Besides this, there are other rooms for the use of the underwriters and for ship-auctions, a library, restaurant, etc., Lloyd's List, containing shipping reports, is published daily, and Lloyd's Register of shipping is issued annually. Originally the London underwriters met at Lloyd's Coffee-house, hence, the name. See Insurance.

LOADSTONE, an ore of iron, consisting of the protoxide and peroxide in a state of combination and frequently called the magnetic oxide of iron. It was known to the ancients, and they were acquainted with the singular property which it has of attracting iron. See Iron, magnet.

LOAM, a soil compounded of various earths, of which the chief are sand, clay, and carbonate of lime or chalk, the clay predominating. Decayed vegetable and animal matter, in the form of humus, is often found in loams in considerable quantities, and the soil is fertile in proportion.

LOAN, anything lent or given to another on condition of return or payment. In law loans are considered to be of two kinds—mutuum and commodate; the former term being applied to the loan of such articles as are consumed in the use, as provisions, or money; the latter to the loan of such articles as must be individually returned to the lender. The acknowledgment of a loan of money may be made by giving a bond, a promissory note, or an I. O. U.,

LOBE'LIA, a very extensive genus of beautiful herbs, natives of almost all parts of the world, especially of the warmer parts of America. One species is the Indian tobacco, which is cultivated in North America, and is employed in medicine.

LOBLOLLY-BAY, the popular name of an elegant ornamental evergreen tree of the maritime parts of the southern United States, having large and showy white flowers. It grows to the height of 50 or 60 feet.

LOBLOLLY-PINE, an American pine, next to the white pine the loftiest in

North America. Its leaves are 6 inches long, united by threes or fours. Its timber is of little value.

LOBSTER, the common name of long-tailed, ten-footed, stalk-eyed crustaceans. The first pair of ambulatory limbs bear the well-known and formidable lobster-claws. The abdomen has rudimentary limbs on its under side, among which are lodged the newly excluded spawn. The tail consists of several flat shelly plates capable of being spread like a fan, and used as a swimming organ. They inhabit the clearest water, living in the crevices of a rocky bottom. Lobsters are esteemed a very rich and nourishing aliment, but dangerous unless fresh and in good condition. They are generally in their best season from the middle of October till the beginning of May. The freshwater lobster is the crawfish or crayfish.

LOCAL OPTION, a term applied to the principle by which a certain majority of the inhabitants or ratepayers of a certain locality may decide as to whether any, or how many, shops for the sale of intoxicating liquors shall exist in the locality.

LOCK, an inclosure in a canal, with gates at each end, used in raising or lowering boats as they pass from one level to another. When a vessel is descending, water is let into the lock till it is on a level with the higher water, and thus permits the vessel to enter; the upper gates of the lock are then closed, and by the lower gates being gradually opened, the water in the lock falls to the level of the lower water, and the vessel passes out. In ascending the operation is reversed, that is, the vessel enters the lock, the lower gates are closed, and water is admitted by the upper gates, which, as it fills the lock, raises the vessel to the height of the higher water.

LOCKOUT. See Strikes and Lockouts.

LOCKE, John, eminent English philosopher, was born at Wrington, in Somersetshire, 1632, and died 1704 at Oates in Essex. So early as 1670 Locke had formed the plan of his famous Essay on the Human Understanding, a plan which he had carefully elaborated, and which he published in its completed



John Locke.

form in 1690. It was received with much opposition, notably by the University of Oxford, who resolved to discourage it; but despite this it acquired a great reputation throughout Europe, and was translated into French and Latin. Briefly, it may be stated that the chief purpose of Locke's celebrated Essay

was to find the original sources and the scope of human knowledge. The conclusions he arrived at were that there is no such thing as an "innate idea," that the human mind is a sheet of white paper prepared to be written upon; that the knowledge thereon written is supplied by experience; and that "sensation" and "reflection" are the two sources of all our ideas.

LOCKPORT, a flourishing manufacturing town in New York, near a series of locks on the Erie Canal, 25 miles from Buffalo. Pop. 18,120.

LOCKWOOD, Belva Ann (Bennett), American lawyer and reformer, was born at Royalton, N. Y., in 1830. In 1879, under a law admitting women, which she had been instrumental in getting passed, she was admitted to practice before the supreme court. She lectured frequently and became prominent in peace, woman suffrage, and temperance movements. In 1884 and in 1888 she was nominated for president by the equal rights party, and in 1896 represented the United States under a commission from the secretary of state at the congress of charities and corrections held at Geneva, Switzerland.

LOCKWOOD, James Booth, American Arctic explorer, was born at Annapolis, Md., in 1852. In 1881 he accompanied Adolphus W. Greely on his expedition to Lady Franklin Bay. His magnetic observations were among the most important results achieved by the expedition. On April 3, 1882, he started on his trip to the North Greenland coast, reaching on May 13th, the land called in his honor Lockwood Island, in latitude 83° 24', the nearest point to the pole which had been reached up to that time, and added 125 miles of coast-line to the map of Greenland. He died in 1884.

LOCOMOTIVE ENGINE. See Steam Engine.

LOCOMOTOR ATAXIA, is a peculiar disease of the nervous system, deriving its name from the fact that the sufferer from it cannot order the movements of his limbs for definite purposes. The patient requires to guide his feet and legs by means of his sight, and even then the feet are jerked out and brought down in a violent way. This difficulty of movement is called "want of co-ordination of movement." The causes of the disease are obscure, its progress usually extends over a number of years, and recovery is rare.

LOCUST, the name of several insects allied to the grasshoppers and crickets. Their hind-legs are large and powerful, which leaves them a great power of leaping. Their mandibles and maxillæ are strong, sharp, and jagged, and their food consists of the leaves and green stalks of plants. They fly well, but are often conveyed by winds where their own powers of flight could not have carried them. The most celebrated species is the migratory locust. It is about 2½ inches in length, greenish, with brown wing-covers marked with black. Migratory locusts are most usually found in Asia and Africa, where they frequently swarm in countless numbers darkening the air in their excursions, and devouring every blade of the vegeta-

tion of the land they light on. They are destructive both in the larval, nymph, and perfect conditions. The Arabs and others use them as food. When dried in the sun they are pounded up and baked into bread, or fried in oil as a delicacy. In America locusts are usually known as



Locust.

"grasshoppers." There are two specially destructive species, one of which is found in Northern New England and Canada; and the other breeds abundantly west of the Mississippi. In the summer months this latter species commits widespread ravages in Texas, Kansas, and Colorado.

LOCUST-TREE is found in the Eastern states, but grows to its best in Kentucky and Tennessee. There it acquires a girth of 4 feet and a height of 80 feet. The leaves are pinnate, smooth, prickly at the base; the flowers grow in pendulous racemes, white, fragrant, and producing smooth pods. The wood of the locust-tree is highly valued for certain purposes, being close-grained, tough, light, and elastic in the best variety; it is reddish-tinted.

LODGE, Henry Cabot, American politician and man of letters, was born in Boston in 1850. From 1873 to 1876 he edited the North American Review, and the following three years was lecturer on American history at Harvard. He then (1879) became editor of the International Review, which post he held till 1881. He was elected to the Massachusetts legislature, 1880-81, and was a



Henry Cabot Lodge.

delegate to the republican national conventions of 1880 and 1884. In 1886 he was elected to the national house of representatives. He was reelected in 1888, and in 1893 succeeded Mr. Dawes as United States senator from Massachusetts. He was reelected in 1899, and in 1905. He has written a Short History of the English Colonies in America; The Story of the American Revolution; and The War with Spain. The "Ameri-

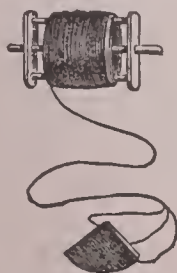
can Statesmen Series" owes to him the lives of Hamilton, Webster, and Washington.

LODI, a town in North Italy, in the province of Milan, in a fertile plain on the right bank of the Adda, 18 miles southeast of Milan. The principal buildings are the cathedral, a Gothic structure of the 12th century, and the Church of the Incoronata. The manufactures consist of majolica, silk, linen, and the great article of trade is Parmesan cheese. Here Napoleon effected the famous passage of the Bridge of Lodi against the Austrians, on the 10th of May, 1796. Pop. 27,811.

LODZ, a town in Russian Poland, in the government of Piotrkow, 76 miles southwest of Warsaw. Pop. 315,209.

LOEB (leb), Jacques, German-American physiologist and experimental biologist, was born in 1859. He was appointed state examiner at Strassburg in 1885, was assistant in physiology at the University of Würzburg in 1886-88, and held a similar position in the University of Strassburg in 1888-90. He made researches in animal physiology at the Naples Zoölogical station in 1889-91. In 1902 he was elected professor of physiology in the University of California. Professor Loeb is the pioneer in the study of the physiology of cells and tissues, including the effects of salt solutions on the muscles of the heart in different animals. He has made experiments on the mechanism of the reflex activities of the lower animals, with especial relation to the different kinds of tropisms and the mode of orientation of organisms. Although the true basis of instinctive acts as inherited reflexes was first pointed out by Herbert Spencer, Loeb has done much by his experiments to show the slight line of demarcation existing between the lower instincts and reflex actions. He has also made notable contributions to other problems in physiological psychology. His essays have appeared in Pfüger's Archiv, and in The American Journal of Physiology. In his book Comparative Physiology of the Brain and Comparative Psychology (1902) will be found the titles of other papers.

LOG, a contrivance used to measure the rate of a ship's velocity through the water. For this purpose there are several inventions, but the one most generally used is the following, called the common log. It is a piece of thin



Ship's log.

board, forming the quadrant of a circle of about 6 inches radius, and balanced by a small plate of lead nailed on the circular part, so as to swim perpendicularly in the water, with the greater part immersed. One end of a line, called the log-line, is fastened to the log, while the

other is wound round a reel. When the log is thrown out of the ship while sailing, as soon as it touches the water it ceases to partake of the ship's motion, so that the ship goes on and leaves it behind, while the line is unwound from the reel, so that the length of line unwound in a given time gives the rate of the ship's sailing. This is calculated by knots made on the line at certain distances, while the time is measured by a sand-glass running a certain number of seconds. The length between the knots is so proportioned to the time of the glass that the number of knots unwound while the glass runs down shows the number of nautical miles the ship is sailing per hour. Thus, if the glass be a half-minute one, it will run down 120 times in an hour. Now, since a nautical mile contains about 6076 feet, the 120th part of this is about 50½ feet; so that if the spaces between the knots be 50½ feet, the number of knots and parts of a knot unwound from the reel in half a minute is the number of miles and parts of a mile the ship runs in one hour.

LOG. See Log-book.

LOGAN, John. A famous Indian chief, the son of Shikellamy, a Cayuga chief noted for his friendship with the whites. In April, 1774, several whites, headed by a man named Greathouse, the keeper of a whisky shop, murdered nearly the whole of Logan's family in cold blood at Yellow Creek. Logan, frenzied by this blow, incited the already restive Indians forthwith to attack the whites, and in the brief war which ensued was himself conspicuous for ferocity and cruelty, taking with his own hands as many as thirty scalps. He disdained to sue for peace along with the other chiefs, after the battle of Point Pleasant, and instead sent to Lord Dunmore, by a trader named John Gibson, a message which is regarded as one of the finest examples of Indian eloquence, though its authenticity has been called into question. Jefferson in his Notes on Virginia quoted it, and first directed general attention to it.

LOGAN, John Alexander, American soldier and political leader, was born in Jackson co., Ill., in 1826. At the outbreak of the war with Mexico he enlisted as a private, and became quartermaster of his regiment, with the rank of first lieutenant. He was a member of the Illinois legislature in 1852-53 and in 1856-57, was prosecuting attorney from 1853 to 1857, and was elected to congress in 1858 as a Douglas democrat. He was reelected in 1860, but resigned his seat in 1861 to enter the army. He was made colonel of the Thirty-first Illinois volunteers, and led the regiment at Belmont, Fort Henry, and Fort Donelson; was wounded in the latter engagement and in 1862 was appointed brigadier-general and a few months later major-general of volunteers. In 1863 he was put in command of the fifteenth corps which he led until the death of McPherson, when he took for a time the command of the army of the Tennessee. After the war he was twice elected to congress and in 1871 he was elected to the United States senate. He was a candidate for the presidential nomination at Chicago

in 1884 but after the unanimous nomination of James G. Blaine was announced he was nominated by acclamation for vice-president. He died in 1886.

LOGAN, MOUNT, the second highest peak of North America. It is situated in the southwestern corner of Yukon territory, Canada, close to the Alaskan boundary. Its height is 19,500 feet.

LOGANSPOUT, the capital of Cass co., Ind., at the junction of the Wabash and Eel rivers; on the Pitts., Cin., Chi. and St. L., the Vandalia, and the Wabash railways; 70 miles n. of Indianapolis. The principal manufactures are galvanized iron, linseed oil, wind-pumps, paper, hubs and spokes, flour, and plow-handles. Pop. 19,140.

LOG'ARITHMS, the common logarithm of a number is the index of the power to which 10 must be raised to be equal to the number. Thus $10^3 = 1000$, so that the logarithm of 1000 (usually written $\log. 1000$) is 3. Now $10^1 = 10$, $10^2 = 100$, $10^3 = 1000$, $10^6 = 1,000,000$, and it is well known that $10^0 = 1$, $10^{-1} = 0.1$, $10^{-2} = 0.01$, etc., thus—

Log. 0.001 = -3	Log. 10 = 1
Log. 0.01 = -2	Log. 100 = 2
Log. 0.1 = -1	Log. 1000 = 3
Log. 1 = -0	Log. 10,000 = 4

It is evident that the logarithm of any number greater than 1 and less than 10 is fractional; the logarithm of any number greater than 10 and less than 100 is greater than 1 and less than 2. Again, the logarithm of any number less than 1 is negative. Suppose we wish to know the logarithm of the number 18.1. In a book of tables we only find the fractional part of the logarithm, it is .257679. Now 18.1 is greater than 10 and less than 100, so that its logarithm is greater than 1 and less than 2; hence $\log. 18.1 = 1.257679$. The integral part of a logarithm is called its characteristic, the fractional part its mantissa. Logarithms make arithmetical computation more easy, for by means of a table of them the operations of multiplication, division, involution or the finding of powers, and evolution or the finding of roots, are changed to those of addition, subtraction, multiplication, and division respectively. For instance, if x and y are the logarithms of any two numbers, the numbers are 10^x and 10^y now the product of these numbers is $10^x + y$, so that the logarithm of the product of two numbers is the sum of the logarithms of the numbers. Again, the quotient of the numbers is $10^x - y$; so that the logarithm of the quotient of two numbers is the difference of the logarithms of the numbers. Again, 10^x raised to the n th power is 10^{nx} ; so that the logarithm of the n th power of a number is n times the logarithm of the number. Logarithms of this kind are common logarithms, and were invented by Briggs; their base, as it is called, is 10. Logarithms were first used by Napier of Merchiston (see Napier, John) and he employed a base which is smaller than 10, namely, the number 2.7182818....., or the sum of the infinite series $2 + \frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \frac{1}{2^4} + \text{etc.}$. This base is denoted by e in mathematical treatises, and the Napierian logarithm of any number, say 7, is $\log_e 7$, to distinguish it from $\log. 7$, which is the common logarithm, whose base is 10.

The common logarithm of a number is found from the Napierian by multiplying by 0.43429448. Napierian logarithms are of great importance in the higher mathematics.

LOG-BOOK, a book kept in ships and into which the direction of the wind, course of the ship, state of the weather at all hours of the day, are daily transcribed at noon, together with every circumstance deserving notice that may happen to the ship or within her cognizance, either at sea or in a harbor, etc.

LOGGIA (loj'ā), a word used in Italian architecture with several significations. First, it is applied to a hall open on two or more sides, where there are pillars to support the roof, such as the Loggia de' Lanzi in Florence. It is also applied to an open colonnade or arcade surrounding a court, or to an



Loggia, palace at Montepulciano.

open gallery at the height of one or more stories in a building, as seen in the figure. The name loggia is also given to the large ornamental window, consisting of several parts, which is often seen in old Venetian palaces; and lastly, it is used to designate a small airy hall, usually open on all sides, constructed on the roof of an edifice.

LOGIC, a department or division of mental science which has been differently defined by authorities. The older school of logicians agreed on the whole in considering it as mainly treating of reasoning and the operations of mind subsidiary to reasoning; and this definition sufficiently indicates the view of the science held by such logicians as Whately and Hamilton. According to them logic dealt only with the form of thought, that is, with what is common to all reasonings, judgments, and concepts respectively, and had nothing to do with the matter, that is, the subject or content of reasonings, judgments, etc. In this view the science of logic was merely deductive, and the syllogistic process, or the intellectual act performed in deducing particular truths from general truths already given, was the main subject of the science. It is evident, however, that in practical research there is another movement or process of the mind of at least equal importance—viz., the process by which the mind reaches general truths from the observation of particulars. This latter is the inductive process, and on it, regarded as the more important element in inference and the ascertainment of truth, John Stuart Mill founded his new system of inductive logic. The nature of scientific evidence, the methods and principles involved in scientific research, are the chief subjects of study in this system of logic.

Very different from both of these are the conceptions of logic given by the chief German philosophers. Kant, in declaring that only the matter (not the form) of experience was given to the mind, had recognized thought as the essential factor of cognition, and had initiated a new co-called transcendental logic, which was an analysis of the general conditions under which the objective world became cognizable. Thus the foundation was laid for a view of reality as in its very nature constituted by thought. Thought or the ego is itself the real, and there being no separate reality logic becomes the system of the forms in and through which thought or intelligence is realized. Logic thus appears, as in Hegel, a complete theory of knowledge and a metaphysic. The earliest work on logic is the *Organon* of Aristotle, who practically gave the science the shape it possesses. See Deduction, Induction, Fallacy, Syllogism, etc.

LOGOMA'NIA, a disease of the faculty of language generally associated with organic disease of the nervous structure, as in paralysis. In this disease, while conceptions and ideas remain clear, the power of associating these with the word by which they are expressed is lost, and the patient can either not give any names to his conceptions at all or expresses them erroneously. Sometimes one class of words is lost and others retained. Thus a patient may forget his own name, or nouns only, and remember all other words. Sometimes he forgets only parts of the word, as terminations and not unfrequently in another form of the disease he inverts his phrases.

LOGRONO (lo-grōn'yō), a town in Spain, capital of the province of same name. Area, 1944 sq. miles; pop. 186,223.

LOGWOOD, a popular name for a tree, which grows in moist and swampy places in Central America, and particularly round the Bay of Campeachy; but is now naturalized in Jamaica and many of the West Indian islands. The tree is usually from 40 to 50 feet high, with pinnate leaves and small yellowish flowers. The wood is red in color, tinged with orange and black, so heavy as to sink in water, and susceptible of receiving a



Logwood.

good polish. It is used chiefly as a dye-wood, the trees being cut down, the bark and alburnum removed, and the hard center parts cut into 3-foot-long logs. To obtain the coloring matter it is hewn into much smaller pieces, and ground or rasped to small chips, or to a coarse powder. The aqueous extract is muddy and

of a reddish-brown color. By acids the red color is made paler; by alkalies it is converted to purple. By mordanting the fabric with iron, black is produced; with alumina, violet and lilac; with copper, blue; and with chromium, a black or green. The coloring power of logwood depends chiefly on a crystalline ingredient called hamatoxylin. It is employed in calico-printing to give a black or brown color, and also in the preparation of some lakes. An extract of logwood is used in medicine as an astringent.

LOH'ENGRIN, the hero of a German poem of the end of the 13th century represented as the son of Percival and one of the guardians of the Holy Grail. Sent by King Arthur to help the Princess Elsa of Brabant, he arrives in a vehicle drawn by a swan, delivers the princess from captivity, and marries her; accompanies the emperor in a campaign against the Hungarians, and fights against the Saracens. He then returns to his bride at Cologne, but being pressed by her to state his origin he is prevailed upon to tell it, after which he must, in terms of his vow, return home to the Grail. The legend has been made the subject of a well-known opera by Wagner.

LOIRE (lwär), the largest river of France, which it divides into two nearly equal portions. It rises on the western slope of the Cevennes, in the department of Ardèche, and flows generally n. n. w. and w. till it falls into the Bay of Biscay below Nantes. Its whole course is about 645 miles, of which about 450 miles are navigable.

LOIRE, a central department of France; area, 1837 sq. miles. The department occupies the upper part of the Loire basin, and consists of the fertile plains which extend on both sides of the river, forming its valley, and long ridges of the Cevennes, which hem the valley in on every side. The capital and great center of industry is St. Etienne; other towns are Roanne and Montbrison. Pop. 647,633.

LOIRE, Haute (ôt-lwär; Upper Loire), a department of Southeastern France; area 1915 sq. miles. Le Puy is the capital. Pop. 314,058.

LOIRE-INFÉRIEURE (lwär-an-fā-ri-eur; Lower Loire), a western maritime department of France, intersected by the lower Loire and its estuary; area, 2653 sq. miles. Nantes is the capital. Pop. 664,971.

LOIRET (lwā-rā), a central department of France; area, 2614 sq. miles. Orleans is the chief town. Pop. 366,660.

LOIR-ET-CHER (lwär-ê-shār), a central department of France; area 2451 sq. miles. The capital is Blois. Pop. 275,538.

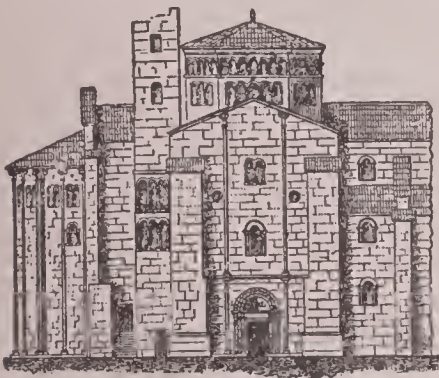
LOK, or **LOKI**, in Scandinavian mythology, the evil deity, father of Hel or Hela, goddess of the infernal regions. He is a personification of the principle of evil, described as of handsome appearance, but perpetually engaged in works of wickedness partly directed against the other gods.

LOLLARDS, a name which arose in the Netherlands about the beginning of the 14th century, and was applied as a term of contempt to various sects or fraternities deemed heretical, being probably derived from the Low German

lollen, to sing in a low tone. The name became well known in England about the end of the 14th century, when it was applied to the followers of Wickliffe, and to others more or less influenced by his teaching. The Wat Tyler revolt of 1381 was directly connected with Lollardism, and latterly the Lollards drew upon themselves the enmity of civil powers, and numbers of them were put to death especially during the reign of Henry V., when apparently another revolt was intended.

LOMBARD, Peter, or Petrus Lombardus, one of the most celebrated of the schoolmen, born near Novara, in Lombardy, about the year 1100. He was a scholar of Abelard in the University of Paris, became a teacher of theology, and at last, in 1159, bishop of Paris, where he seems to have died in 1164. His work *Sententiarum Libri Quatuor* is a classified collection of the opinions of the fathers on points of doctrine, with a statement of the objections made to them, and the answers given by church authorities. Hence he is known as the Master of Sentences.

LOMBARD ARCHITECTURE, the form which the Romanesque style of architecture assumed under the hands of the Gothic invaders and colonists of the north of Italy, comprising the buildings erected from about the beginning of the 9th to the beginning of the 13th century. It forms a connecting link between the romanized architecture of Italy and the Gothic of more northern countries. The most characteristic feature of the churches built in this style is the general introduction and artistic development of the vault, that feature which afterward became the formative principle of the whole Gothic style. In the Lombard architecture also pillars consisting of several shafts arranged round a central mass, and buttresses of small projection, appear to have been first employed. The tendency to the prevalence of vertical lines throughout the design, instead of the horizontal lines of the classic archi-



Lombard architecture. Transept, apse, and dome of St. Michael, Pavia.

ture, is also characteristic, as well as the use of the dome to surmount the intersection of the choir, nave, and transepts. Mr. Fergusson remarks: "Generally speaking the most beautiful part of a Lombard church is its eastern end. The apse with its gallery, the transepts, and, above all, the dome that almost invariably surmounts their intersection with the choir, constitute a group which al-

ways has a pleasing effect, and is very often highly artistic and beautiful." As examples of Lombard architecture may be mentioned the church of St. Michael, Pavia; San Zenoni, Verona; and the atrium of San Ambrogio, Milan.

LOMBARDS, LONGOBARDI, or LANGOBARDI, a Germanic or Teutonic people who at the beginning of the Christian era were dwelling on the Lower Elbe. They make little appearance in history till the 6th century, when, under their king Alboin, they entered Italy in April 568, and, with the help of Saxons and others, conquered the northern portion, which hence received the name of Lombardy. Alboin was assassinated in 573 (see Alboin), and after some years of great confusion Autharis was recognized in 585 as king. He was a warlike and politic ruler, who gained the good-will of the subject Roman population, and in-

eight provinces (Bergamo, Brescia, Como, Cremona, Mantua, Milan, Pavia, and Sondrio), containing an area of 9086 sq. miles and a population of 4,282,728.

LOMBOK, an island, belonging to the Dutch, in the Indian Archipelago. The capital is Mataram on the west coast. Pop. 650,000.

LOMBROSO, CESARE (chā'zā-rē lōmbrō'sō), Italian Scientist, was born in Verona in 1836. In 1862 he became professor of psychiatry at Paris and later of medical jurisprudence and psychiatry at Turin. He became widely known through his investigations of the abnormal human being and through his theories deduced therefrom; theories which encountered great opposition and are not yet entirely accepted but which formed in part the basis for the present criminal anthropology. His published works are: *The Criminal*, *The Man of*



LONDON.—(1) The Thames embankment, Cleopatra's needle, Charing Cross and Westminster bridges, the houses of parliament, etc., looking up the river. (2) The Thames embankment, Waterloo bridge, St. Paul's, etc., looking down the river. Both views from the Savoy hotel.

stituted a better system of government than had hitherto existed. He married Theodelinde, a Frankish princess, who began the process of converting the Lombards from Arianism to the orthodox faith. The only king of note among the successors of her family was Rothari, who in 643 promulgated a system of laws, which, with subsequent additions, became among German jurists the basis of the study of law during the middle ages. From 713 to 744 the Lombards had a powerful king in the person of Liutprant, who extended his sway, at least temporarily, over the whole of Italy. From that time the power of the Lombards gradually declined, and finally Charlemagne captured Pavia after a six months' siege, and put an end to the Lombard Kingdom (773 or 774), the last monarch being Desiderius.

LOMBARDY, the part of Upper Italy which took its name from the Lombards and which at first extended from the Adriatic to the Savoyan Alps. Lombardy is now the name of an Italian department (*compartimento*), embracing

Genius, *The Anarchist*, *The Cause of and Contest Against Crime*. He died in 1907.

LOMZA, a town of Russian Poland capital of the government of the same name. Pop. 18,000. The government of Lomza covers an area of 4760 sq. miles mostly flat and of a fertile soil. Pop. 608,000.

LONDON, the capital of the British Empire and the largest city in the world is situated in the southeast of England on both sides of the River Thames, which winds through it from west to east. The river is crossed by numerous bridges, and is deep enough to allow large vessels to come up to London Bridge, the lowest of these (except the movable Tower Bridge) where it is 266 yards wide. London may be said to stretch from east to west about 14 miles, from north to south about 10 miles. Its area may be stated at 74,672 acres, this being the area to which the registrar-general's tables of mortality refer. The population within this area was 4,228,317 in 1891, and 4,536,063 in 1901. It is also the area of the administrative county, and of the school board district.

of London. The area embraced by the Metropolitan and City police districts, including all parishes within 15 miles of Charing Cross, is spoken of as Greater London; it covers 443,252 acres; pop. in 1891, 5,633,806; in 1907, 7,000,000. As regards population London is thus on a level with Scotland, Holland, Portugal, or Sweden.

The greater portion of London lies on the north side of the Thames, in the counties of Middlesex and Essex, mainly the former, on a site gradually rising from the river, and marked by several inequalities of no great height, except in the northern suburbs, where the elevation of 430 feet is reached; on the opposite bank, in the county of Surrey and partly in Kent, the more densely built parts cover an extensive and nearly uniform flat, in some places below the level of the highest tides, while the outskirts are mostly elevated. The nucleus of London was formed by what is still distinctively the City of London, situated in the heart of the metropolis on the north bank of the Thames. The city is a separate municipality, having a civic corporation of its own, at its head being the Lord-mayor of London. The city occupies only 671 acres, and has a resident population of only 27,000. Westminster, another portion of old London, associated with the sovereigns, the parliaments, and the supreme courts of justice of England for over 800 years, borders with the city on the west; while across the river from the city lies the ancient quarter of Southwark, or "The Borough."

As the capital of the British Empire London is from time to time the residence of the sovereign and court. It contains the buildings for the accommodation of parliament and all the great government departments. It is the chief intellectual center of Britain, if not of the world, and is equally great as a center of commerce, banking, and finance generally.

Although in the different districts of London, with the exception of the parts most recently built, there are numerous narrow and crooked streets, yet the whole extent of the metropolis is well united by trunk lines of streets in the principal directions, which render it comparatively easy for a stranger to find his way from one district to another. Piccadilly and Pall Mall; the Strand and its continuation, Fleet street; Oxford street and its continuations, Holborn, Holborn Viaduct, and Cheapside, are among noteworthy streets running east and west; while of those running north and south, Regent street, perhaps the handsomest street in London, and the location of fashionable shops, is the chief. The Thames embankment on the north or Middlesex side, known as the Victoria embankment, also forms a magnificent thoroughfare, adorned by important buildings, and at different points with ornamental grounds and statues. A number of magnificent bridges cross the Thames. A considerable traffic passes under the river by means of tunnels or underground passages, some of them for electric railways. The old Thames Tunnel, 2 miles below London Bridge, opened in 1843, is now traversed by a railway.

The chief parks are in the western portion of the metropolis, the largest being Hyde Park and Regent's Park, which, together with St. James's Park and the Green Park, are royal parks. The most fashionable is Hyde Park, containing about 400 acres. Regent's Park, in the northwest of London, north of Hyde Park, containing the gardens of the Zoological Society and those of the Royal Botanic Society, covers an area of 470 acres. The Zoological Gardens contain the largest collection in the world. Of the squares the most central and noteworthy is Trafalgar Square, with Charing Cross adjoining. Among the public monuments are "The Monument" on Fish Street Hill, London Bridge, a fluted Doric column 202 feet high, erected in 1677 in commemoration of the great fire of London; the York Column, in Waterloo Place, 124 feet high; the Guard's Memorial (those who fell in the Crimea), same place; the Nelson Column, in Trafalgar Square, 176



Ludgate Hill and St. Paul's, London.

feet high, with four colossal lions by Sir E. Landseer at its base; the national memorial to Prince Albert in Hyde Park, probably one of the finest monuments in Europe, being a Gothic structure 176 feet high, with a colossal statue of the prince seated under a lofty canopy; Cleopatra's Needle on the Thames Embankment; a handsome modern "cross" at Charing Cross; numerous statues of public men, etc.

Among the royal palaces are St. James's, erected by Henry VIII.; Buckingham Palace, the King's London residence, built by George IV.; Marlborough House, the residence of the Prince and Princess of Wales; Kensington Palace, the birthplace of Queen Victoria. These are all in the west of London. Lambeth Palace, the residence of the Archbishops of Canterbury, is situated on the Surrey side of the river. On the north bank of the Thames stand the houses of parliament, a magnificent structure in the Tudor Gothic style, with two lofty towers. The buildings

cover about 8 acres, and cost \$15,000,000. Westminster Hall, adjacent to the houses of parliament, was formerly the place in which the supreme courts of justice sat, but is now merely a promenade for members of parliament. In and near Whitehall in the same quarter are the government offices, comprising the foreign, home, colonial, and India offices, the horse guards and admiralty. Somerset House, which contains some of the public offices, is in the Strand. The post-office in the city occupies two spacious and handsome buildings. Adjoining the city on the east is the Tower, the ancient citadel of London, which occupies an area of 12 acres on the banks of the Thames. The most ancient part is the White Tower, erected about 1078 for William the Conqueror. One of the most important of recent public buildings is the new Law Courts, a Gothic building at the junction of the Strand and Fleet street. Other noteworthy buildings are the Bank of England; the Royal Exchange; the Mansion House, the official residence of the lord-mayor; the Guildhall, the seat of municipal government of the city; the four Inns of Court (Inner and Middle Temple, Lincoln's Inn, Gray's Inn); etc.

Among the churches the chief is St. Paul's Cathedral, completed in 1710 by Sir Christopher Wren. Westminster Abbey dates from the reign of Henry III. and Edward I. It adjoins the houses of parliament. Here the kings and queens of England have been crowned, from Edward the Confessor to Edward VII. In the south transept are the tombs and monuments of great poets from Chaucer downward, whence it is called "Poet Corner," and in other parts are numerous sculptured monuments to sovereigns, statesmen, warriors, philosophers, divines, patriots, and eminent individuals generally, many of whom are interred within its walls.

Among the museums and galleries the principal is the British Museum, the great national collection. It contains an immense collection of books, manuscripts, engravings, drawings, sculptures, coins, etc. The South Kensington Museum is a capacious series of buildings containing valuable collections in science and the fine and decorative arts, and there is a branch museum from it in Bethnal Green, in the East End. The chief picture-galleries are the National Gallery, in Trafalgar Square, the National Gallery of British Art, the collection in South Kensington Museum, and the National Portrait Gallery.

London is one of the healthiest of the large cities of the world, the annual death-rate per 1000 being in recent years about 18 or 19. The sewerage system is necessarily gigantic, there being altogether about 250 miles of sewers. There is no single system of water supply, the water being furnished by several companies from the Thames, the Lea, and other sources.

The city of London proper is governed by a lord-mayor, chosen annually, and by twenty-five aldermen, four sheriffs, and two hundred and thirty-two common councilmen. The lord-mayor is elected by the members of the city guilds or companies, known as the

liverymen, and numbering about 7000. A body known as the Metropolitan Board of Works, created in 1855, took charge of all general improvements, and had the management of all public works in which the ratepayers of the metropolis had a common interest up to 1889, when it was superseded by the London County Council under the Local Government Act of 1888. The administrative county of London comprehends the whole of the metropolitan parliamentary boroughs, which elect 118 councillors; there being also 19 aldermen (or a number not to exceed one-sixth of the councillors). The city of London is unaffected by this change, except that its sheriffs are no longer sheriffs of Middlesex, and the right of appointing certain judicial officers is transferred from the corporation to the crown. By the London government Act of 1899 the county was divided into separate boroughs, each under its own mayor, aldermen, and council. The metropolitan police force numbers nearly 16,000, the city police over 1000.

LONDON, a town of Canada, the capital of Middlesex co., Ontario, on the Thames and the Great Western Railway, 121 miles west of Toronto. There are extensive oil-refining works, iron-foundries, chemical works, and other manufacturing establishments. It is the center of a fine agricultural region, and carries on an active trade in wheat and agricultural produce. Pop. 37,981.

LONDON, University of, was originally established as a joint-stock undertaking in 1825. In 1836 two charters were granted, one to London University, with power merely to examine and grant degrees, another to a teaching body, which took the name of University College. Supplementary charters were granted in 1858, 1863, and 1878, the last admitting women to all degrees and prizes. The university itself still continued to confer degrees simply, but by an act passed in 1898 provision was made for its reconstruction, whereby it should become both a teaching and an examining body; and in accordance with regulations, coming in force in 1900, the university embraces a number of institutions, in which students receive instruction in all branches of knowledge. These include University College, King's College, and a number of metropolitan institutions, medical, theological, scientific, etc.; the faculties of the university being eight in number. The university still continues to confer degrees on all comers after examination, admitting as a candidate any person who is above sixteen years of age. Provincial examinations are carried on simultaneously with the London ones.

LONDONDERRY, a city and seaport in the north of Ireland, capital of the county of the same name, on the river Foyle, which is here crossed by an iron bridge 1200 feet long. The harbor is commodious, and vessels of large tonnage can discharge at the town. Pop. 39,892.—The county is bounded on the north by Lough Foyle and the Atlantic Ocean, elsewhere by Tyrone, Lough Neagh, and Antrim; area, 522,315 acres. Pop. 144,404.

LONDONDERRY, Robert Stewart,

Second Marquis of, British statesman, born in county Down, 1769. In 1796 he became Lord Castlereagh, and, being a member of the Irish parliament, next year he was made keeper of the privy-seal for that kingdom, and the year after chief secretary to the lord-lieutenant. In 1812 he became foreign secretary and he was a member of the congress of Vienna in 1814. He became very unpopular through his conduct on this occasion and his support of the Holy Alliance; and the responsibilities which he had to assume as virtual prime-minister in connection with repressive measures for the protection of order, and the fatigues of an arduous session, seem to have unhinged his mind, leading him to commit suicide in 1822. He had succeeded his father the year before as Marquis of Londonderry.

LONG, Crawford W., American surgeon, probably the first to use ether anæsthesia in surgery, was born in Danielsville, Ga., in 1815. Having learned of the insensibility produced by inhaling ether vapor, Long experimented upon himself, and in March, 1842, administered ether and during the patient's unconsciousness excised a tumor from his neck. In 1902 the Georgia Medical Association began to collect funds with which to erect a statue of Long in the Capitol at Washington, as "the discoverer of anæsthesia." He died in 1878.

LONG, Edwin, an English artist, born in 1839, died 1891, gained a high reputation as a painter of historical scenes from Eastern history. Among his more important works we may mention, Babylonian Marriage Market (1875), An Egyptian Feast (1877), Gods and Their Makers (1878), Esther and Vashti (1879), Why Tarry the Wheels of his Chariots (1882), Judith, Thisbe, Anno Domini (1884), Callista the Image Maker (1887). Mr. Long has also achieved considerable success in portraiture. He was elected a member of the Royal Academy in 1882.

LONG, George, English scholar, born 1800, died 1879. He was one of the founders of the Royal Geographical Society, and did much work in connection with the Society for the Diffusion of Useful Knowledge, including the editing of the Penny Cyclopaedia.

LONG, Stephen Harriman, American engineer and explorer, born at Hopkinton, N. H., in 1784. In 1814 he was appointed second lieutenant, U. S. A., in the Corps of Engineers, from 1814 to 1816 was assistant professor of mathematics at the United States Military Academy. In 1816 he made under great difficulties a survey of the Mississippi and its branches, and soon after led an expedition from the Mississippi to the Rocky Mountains, one of the noblest peaks of which bears his name. In 1861 he was appointed chief of topographical engineers with rank of colonel, and in 1863 retired from the army. He died in 1864.

LONG-BOAT, a large ship's boat, carvel built, from 32 to 40 feet long, having a beam from .29 to .25 of its length.

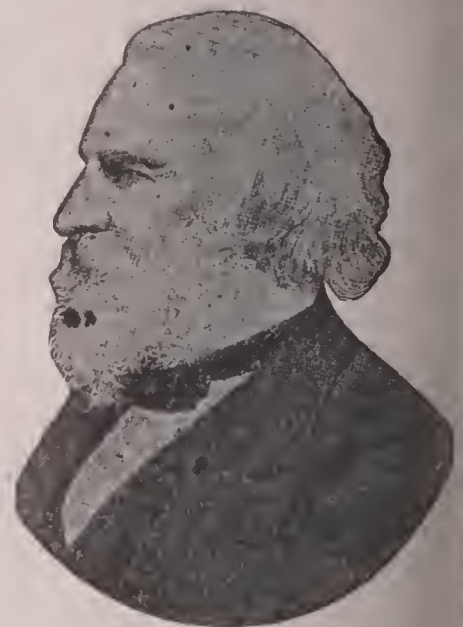
LONG-BOW. See Bow.

LONG BRANCH, a fashionable watering-place in New Jersey, 30 miles

south of New York City. It has wide avenues with numerous hotels, boarding-houses, and cottages. The permanent population is about 9000, but during summer is sometimes increased by 50,000.

LONGEVITY, a term which is used both for average or probable duration of life in a community, or for great length of life reached by particular individuals. When the sexes are considered separately the average duration of life is somewhat higher in women than in men. The question of the extreme limit to which human life may possibly attain is also of great interest. Ordinary observation leads to the conclusion that a comparatively small number of men reach the age of 70, a very much diminished number attain to 80, while 90 is rare. There are, however, well-authenticated cases of persons who have reached 100 years and even a few years more; but such cases as that of Thomas Parr, said to have been 152 years old, and Henry Jenkins, said to have been 169, rest on merely unreliable assertion. See Mortality-table in Insurance Life.

LONGFELLOW, Henry Wadsworth, American poet, was born at Portland, Maine, 1807; died 1882. In 1833 he published a volume of translations from Coplas de Manrique, with an essay on the Moral and Devotional Poetry of Spain; in 1835 appeared *Outre Mer*, a volume of prose sketches, and in the same year he was elected to the chair of modern languages and literature in Harvard University. In 1839 he published



Henry W. Longfellow

Hyperion, a Romance, and *Voices of the Night*, a series of poems. Ballads and other Poems and a small volume of Poems on Slavery appeared in 1842; the *Spanish Student*, a drama in three acts in 1843; the *Belfry of Bruges* in 1846; *Evangeline* in 1847. In 1849 he published *Kavanaugh*, a tale in idyllic prose; in 1850 the *Seaside* and the *Fireside*; in 1851 *The Golden Legend*; in 1855 *Hiawatha*; in 1858 the *Courtship of Miles Standish*; in 1863 *Tales of a Wayside Inn*.

side Inn; in 1866 Flower de Luce; in 1867-70 an excellent poetical translation of Dante; in 1869 New England Tragedies; in 1871 the Divine Tragedy; in 1872 Three Books of Song; in 1874 the Hanging of the Crane; in 1875 Morituri Salutamus and the Masque of Pandora; and in 1878 Keramos. He resigned his chair at Harvard in 1854. In 1868-69 he again traveled in Europe, and received the degree of LL.D. and D.C.L. from the Universities of Cambridge and Oxford respectively. His poems are equally popular on both sides of the Atlantic.

LONGFORD, an inland county of Ireland, in the province of Leinster bounded on the west by the Shannon and Lough Ree; area, 269,409. acres. Pop. 46,581.

LONGICORN BEETLES, a family of Coleoptera, including a vast number of large and beautiful beetles, all remarkable for the length of their antennæ, which, in the males of some of the



Longicorn beetle.

species, are several times longer than their bodies. The females deposit their eggs beneath the bark of trees by means of a long, tubular, horny ovipositor, and the larvæ are very destructive to wood.

LONG ISLAND, an island belonging to the state of New York, extending 118 miles in length, and varying from 12 to 23 miles in breadth; area, 1682 sq. miles. It is connected with New York City by two great suspension bridges carried across East river, and is separated from Connecticut by Long Island Sound. There are considerable tracts covered with timber; the most fertile portions are carefully cultivated, and much produce is sent to New York and Brooklyn. Railways are numerous. The chief city is Brooklyn, but there are many popular seaside resorts along the coast. Pop. 1,600,000.

LONG ISLAND CITY, a town on the west coast of Long Island, and separated from Brooklyn by Newtown Creek. The city contains extensive warehouses, oil-refineries, timber-yards, machine-shops, manufactures of carpets, etc. Since 1898 it has been part of Greater New York. Pop. 48,272.

LONG ISLAND SOUND, an arm of the sea between Long Island and the state of Connecticut, about 115 miles long and generally about 20 miles wide. It is connected with New York Bay by the strait called East river. See East River, Hell Gate.

LONGITUDE, in geography, the distance of a place due east or west from a meridian taken as a starting-point, this distance being measured along the equator or a parallel of latitude; in other words, it is the angle between the merid-

ian plane of one place and some fixed meridian plane. Longitudes are generally reckoned from the meridian of Greenwich; the meridians of Paris, Ferro, and



Washington are or have been also employed. (See Meridian.) Since the parallels of latitude get smaller toward the poles, at which all the meridians converge, it is evident that degrees of longitude which are $69\frac{1}{2}$ statute miles long at the equator get shorter toward the poles, at which they finally become 0, as will be understood from the accompanying cut. As the earth makes one revolution on its axis, that is turns through 360° of longitude from west to east, in twenty-four hours, if the sun or a star is on the meridian of any place at a particular time it will be on the meridian of another place 15° west of the first in one hour. Thus 15° of longitude represent one hour of difference in time, and hence longitude may be easily determined by the use of the chronometer set to Greenwich time, which is the method commonly employed at sea. Longitude is reckoned to 180° eastward or westward of the fixed meridian. The latitude and longitude of a place are what enables us to fix its exact position on a map or globe. Celestial longitude is quite analogous to terrestrial.

LONGSTREET, General James, American soldier, born in South Carolina 1821. He graduated at the Military Academy in 1842; saw much service on the Mexican frontier, and took a prominent part on the confederate side during the civil war. Since the close of the war he has occupied several important offices, including that of ambassador to Constantinople. He died in 1904.

LONG'WORTH, Nicholas, American horticulturist, born in Newark, N. J., 1783. He is especially noted for his efforts to establish grape-growing in the Ohio valley. So successful was he that he has been called "The Father of American Grape Culture." Not only was he a pioneer and leading horticultural expert in his section, but was recognized as an authority in national horticultural matters. He died in 1863.

LOO-CHOO, LEW-CHEW, LIU-KIU (Japanese, Riu-Kiu), a chain of islands in the Pacific between Japan and Formosa, and between lat. $24^\circ 10'$ and $28^\circ 40' N.$; but the name is sometimes extended also to the group further north, properly known as the Linschoten Islands. The largest island is Okinaw, or Great Loo-Choo (area about 500 sq.

miles). Oshima the island next in size, has an area of 300 sq. miles. Since 1874 the archipelago has belonged to the Japanese empire. Confucianism is the prevailing religion, but Buddhism has a considerable number of adherents. Pop. 460,000.

LOOM. See Weaving.

LOON, or **GREAT NORTHERN DIVER**, popular name of a swimming bird of the family Urinatoridæ, found in both hemispheres. It is a large, solitary bird, 32 inches long, very difficult to shoot. It is a fine diver, perfectly at home in air or water, but by no means so on the land, its feet being set so far back that it can not walk at all, but



Great northern diver.

scrambles along scraping its breast on the ground.

LOPE DE VEGA. See Vega.

LOPEZ, Francisco Solano, President of Paraguay, born at Asuncion in 1827, son of Don Carlos Antonio Lopez, then president. He filled some of the principal offices of state, and was sent to Europe in 1853, accredited to the chief courts there. In 1855 he returned to Paraguay, became minister of war, and on the death of his father, in 1862, president for ten years. He had long been aiming at the foundation of a great inland empire, and as his military preparations were now complete, and his army superior to that of any of the South American states, he took opportunity in 1864 to commence hostilities against Brazil. The Argentine Republic and Uruguay allied themselves with Brazil, and after five years' conflict Lopez was reduced to extremities, and was finally surprised on the banks of the Aquidaban by a troop of Brazilian cavalry and slain, 1st March, 1870.

LOPHOBANCHII, the sub-order of Teleostean fishes, including the peculiar "Sea-horses" and the "Pipe-fishes." See Pipe-fishes and Sea-horses.

LOQUAT, a Japan fruit-tree. The fruit is about the size of a large gooseberry, of a fine yellow color. The tree is a beautiful evergreen, whose white flowers have a fragrance like that of hawthorn blossom. It attains a height of from 20 to 30 feet, but when cultivated it is not allowed to exceed 12 feet.

LORAIN a town in Lorain co., Ohio, on Lake Erie, at the mouth of the Black river, and on the N. Y., Chi. and St. L. and the Cleve., Lorain and Wheel. railways; 26 miles w. of Cleveland. Pop. 19,356.

LORCA, a town of Southern Spain, in the province and 42 miles southwest of Murcia, consists of an old Moorish town on a slope crowned by a castle, and a lower modern town. There are manufactures of coarse woollens, linens, leather, soap, and earthenware, and an important annual fair which lasts fourteen days. In the vicinity are lead-mines. Pop. 69,836.

LORCHA, a light Chinese sailing vessel, carrying guns, and built after the



Lorcha.

European model, but rigged like a Chinese junk.

LORD (Anglo-Saxon hláford, for hláfweard, that is bread-keeper), a title of honor or dignity, used in different senses. In the feudal times a lord was the grantor or proprietor of land, who retained the dominium or ultimate property of the land or fee, the use only being granted to the tenant. A person who has had the fee of a manor, and consequently the homage of his tenants, is called the lord of the manor. Loosely all who are noble by birth or creation, as the peers of Britain, may be called lords. The lords temporal, in contradistinction to the lords spiritual, are the peers who sit together in the house of lords, as opposed to the bishops who have seats in the house. Lord is sometimes only an official title, as lord advocate, lord mayor, etc. It is also applied, but only by courtesy, to the sons of dukes and marquises, and to the eldest sons of earls.

LORD MAYOR, the title given to the chief magistrates of London, Dublin, York, etc., during the year for which they hold office.

LORD-MAYOR'S-DAY, the 9th of November, on which a great procession accompanying the newly-elected Lord Mayor of London, from Westminster to Guildhall, takes place. The procession, formerly famous for its historical and allegorical devices, has now much dwindled.

LORDS, House of. See Parliament; also Britain, Peerage.

LORD'S PRAYER, a formula of prayer enunciated by Christ on two different occasions, for which see Matt. vi. 5-13, Luke xi. 1-4. Among the earliest Christians it was accepted as the standard form of prayer, and its use in the liturgy is frequently mentioned by the early fathers. The concluding clause of the prayer, known as the doxology, "For Thine is the kingdom," etc., is not found in St. Luke's gospel, and even in that of St. Matthew it is only found in some of the later manuscripts, in which

it is generally held to be an interpolation. It is generally retained by Protestants, but is discarded by Roman Catholics.

LORD'S SUPPER, one of the sacraments of the Christian religion: so named because it was instituted by our Saviour when he took his last meal with his disciples, on the occasion of celebrating the Passover. It has also the names of eucharist and communion, and among the Catholics that of the mass or sacrifice of the mass. It has undoubtedly been celebrated, with certain differences, ever since its institution, and still is celebrated by all sects of Christians except the Quakers, however much their views may differ as to its nature and virtue. The chief controversies regarding the nature of the rite have been chiefly on the question of the "real presence" of Christ's body and blood and the doctrine of transubstantiation. The doctrine of transubstantiation, first started by Paschasius Radbertus in the 9th century, was soon generally received and at last was officially approved by the Council of Rome in 1079, and solemnly confirmed in 1215 by the fourth Lateran Council. According to this doctrine the whole substance of the bread and wine in changed into the body and blood of Christ, only the appearance of bread and wine remaining; and the Roman Catholic Church further maintains that Christ is given wholly and entirely both under the form of the bread and under that of the wine. From the doctrine of transubstantiation sprang the adoration of the host (or sacred bread), as well as the custom of refusing the cup in the communion to the laity and non-officiating priests, a practice first authoritatively sanctioned at the Council of Constance, 1415. At the Reformation both the German and Swiss reformers agreed in rejecting the doctrine of transubstantiation and the mass, and maintaining that the Lord's supper ought to be celebrated before the whole congregation, and with the administration of both bread and wine. In explaining the words by which the supper was instituted Luther and Zuinglius differed, and their different opinions on this subject formed the principal subject of dissension between the Lutheran and Calvinistic churches. Luther took the words, "This is my body," etc., in their literal sense, and thought that the body and blood of Jesus Christ are united, in a mysterious way, with the bread and wine, which, however, remain unchanged, so that the communicant receives, in, with and under the bread and wine, the real body and blood of the Redeemer. Zuinglius, on the other side, understood the words in a figurative sense and maintained that the Lord's supper was a mere commemoration of the death of Christ, and a profession of belonging to his church. This view is in substance adopted by the Socinians, Arminians, and some others. The opinion advanced by Calvin, by which a spiritual presence of the body and blood of Christ is supposed in the communion, by partaking of which the faithful receiver is brought into union with Christ, through the medium of the Holy Ghost, though it came nearer to

the Lutheran doctrine than that of Zuinglius did, yet was essentially different. The Greek Church has not adopted the doctrine of transubstantiation in its whole extent; yet her doctrine, which was defined and sanctioned by the Synod of Jerusalem in 1672, comes nearer to this dogma than to that of the Reformed church. The Anglican Confessions incline more to the view of Zuinglius. The 28th Article of the Church of England declares that "the body of Christ is given, taken, and eaten in the supper only after an heavenly and spiritual manner." The doctrine adopted by the Presbyterian Church of Scotland in the main agrees with that propounded by Calvin.

LORELEI (lô're-lî), a precipitous cliff on the Rhine, about 450 feet high, half a mile above St. Goar. Legend gives it as the abode of a siren, who by her singing enticed boatmen thither to their destruction.

LORENZ (lô'rênts), Adolf, Austrian orthopædic surgeon was born in 1854. He graduated from the University of Vienna in 1880. The operation which made him famous—the so-called "bloodless" reduction of congenital dislocation of the hip-joint—was developed only after years of experiment. Beginning with the "open" method of Haffa, he modified it by stretching and parting instead of cutting the muscles—the Haffa-Lorenz operation—and finally in 1892 conceived the idea of reducing the hip by manipulation alone. In 1895 he demonstrated the method before the medical congress at Berlin, and it found general acceptance. In 1902 he visited the United States and England; he demonstrated his methods in both countries. He devised several other orthopædic operations besides that for the reduction of hip dislocations, notably one for the straightening of club-foot, and has invented several instruments.

LORIS, a genus of quadrumanous mammals allied to the lemurs. Two species only are known, the short-limbed loris and the slender loris, both natives of



Slender loris.

the East Indies. They are not much larger than rats, and are nocturnal and arboreal in their habits.

LORIS-MELIKOFF, Michael Tarielovich Tainoff, Count, Russian general born 1826 at Tiflis, died 1888. Was made lieutenant-general in 1863; commander of the army in Armenia in 1876. In 187

he was made a count; in 1879 governor-general of Charkow, in which post he suppressed the Nihilistic conspiracies with much vigor. In 1880 he was appointed minister of the interior, in which post he showed a tendency towards measures of a wide remedial kind, and had persuaded the czar, Alexander II., to call a kind of national representative assembly, when the assassination of the latter occurred, March, 1881. On the accession of Alexander III. Loris-Melikoff's position became untenable, and he resigned in 1881.

LORNE, Right Hon. John George Douglas Sutherland Campbell, Marquis of, born in 1845, married the Princess Louise in 1871, and was governor-general of Canada from 1878 to 1883. He succeeded to the dukedom on his father's death in 1900.

LORRAINE, a territory now divided between Germany and France, was originally so named as being the kingdom of Lothaire II. It was afterward divided into two parts, Upper and Lower Lorraine. The latter, between the Rhine Meuse, and Scheldt, became the duchy, of Brabant, and ultimately a part of Belgium. Upper Lorraine, between the Rhine, Saône, and Meuse, was for long an independent duchy, but was ceded to France in 1736. The inhabitants, though of German origin, speak the French language, except those of the district between Metz and the Vosges, which was on that account called German Lorraine. At the end of the war between France and Germany in 1870-71 a considerable portion of Lorraine, including the fortresses of Metz and Thionville, was annexed to Germany, and now forms part of the imperial territory of Alsace-Lorraine (which see).

LORRAINE, Claude. See Claude Lorraine.

LORY, a group of scansorial birds, having broad tails, and dense soft plumage, the colors of which are extremely brilliant. They are found mostly in the



Purple-capped lory.

Eastern Archipelago, but also in New Guinea, Borneo, and the South Sea Islands.

LOS ANGELES (lōs an'je-les), the capital of Los Angeles county, California on the river of the same name, about 15 miles from the Pacific coast. It has extensive vineyards, orange and olive plantations, corn-mills, paper-mills, distilleries, iron-foundries, and an active commerce. Gold, silver, copper, and zinc are found in the neighboring mountains. Pop. 1909, about 300,000.

LOT (lō), a department in the south of France; area, 2020 sq. miles. The capital is Cahors. Pop. 271,514.

LOT-ET-GARONNE (lō-e-gā-ron), a department in the southwest of France; area, 2050 sq. miles. Capital Agen. Pop. 278,740.

LOTI (lō'tē'), Pierre, name assumed by Louis Marie Julien Viaud. A French novelist and naval officer, was born at Rochefort, in 1850. He entered the marine service in 1867 and traveled extensively, resigning his naval office in 1898 with the rank of lieutenant. His novels include: *Aziyadé*, *Rarahu* (or *Le Mariage de Loti*), *Le roman d'un spahi*, *Mon frère Yves*, *Le pêcheur d'Islande*, *Le Kasbah*, *Madame Chrysanthème*, *Ramuntcho*, *Au Maroc*, *Le Désert*, *Galilée*. He was elected a member of the French Academy in 1897.

LOTIONS, liquid remedies, consisting principally of distilled or filtered soft water holding in solution various medicinal substances, and applied externally. Lotions are either cooling, stimulating, astringent, soothing, or sedative.

LOTTERY, a scheme for the distribution of prizes by chance, the plan being generally to have a certain number of prizes and a much greater number of tickets, the prizes being allotted according as the drawing of numbered tickets from a suitable receptacle shall decide. Lotteries on the large scale originated in Italy, from which they passed into France. In England the first public lottery occurred in 1569, the proceeds being devoted to public works. In 1612 a lottery was granted in behalf of the Virginia Company. In 1709 the rage for private, and, in many instances, most fraudulent lotteries, was at its height in England, and toward the close of the year an existing act of parliament was put in force for the suppression of such lotteries as public nuisances. Government lotteries still continued, however, and large sums of money were raised by them; but in 1826 lotteries were entirely abolished in Britain, except in the case of art-unions, which are permitted from their supposed good effects in encouraging art. In France the demoralizing influence of lotteries caused their suppression in 1836, with the effect of largely increasing in the following year the deposits in the savings-bank. They are still exceptionally permitted. Lotteries for merchandise of all kinds, from estates to pictures, are common in Germany; and in Italy and Austria the governments draw an important part of the revenue from their management of money lotteries. In most of the United States lotteries formerly very commonly resorted to as means of assisting colleges or benevolent institutions, have been abolished, or at least require a special authorization from the legislature.

LOTUS, a name applied to a number of different plants, from the lotus famous in Greek legend. One of these is a native of Northern Africa and Southern Europe. It is a shrub 2 or 3 feet high, bearing a fruit, the jujube, which is a drupe of the size of a wild plum. The name lotus was also given to several species of water-lily, as the blue water-lily, the Egyptian water-lily, and to the nelumbo, which grow in stagnant or slow running waters. Lotus are often found figured on Egyptian buildings, columns, etc., and the nelumbo, or

Hindu and Chinese lotus, bears a prominent part in the mythology of these countries. The name is also given to a genus of plants consisting of creeping herbs and undershrubs, chiefly natives of temperate regions throughout the world.

LOUBET (lōō'bā'), Emile, a French statesman, seventh president of the French republic, was born at Marsanne, in the department of Drôme, Southern France, in 1838. In 1876 he was elected to the chamber of deputies. Here he joined the group known as the Republican Left. He was reelected to the lower house in 1877 and 1881, and in 1885 was chosen senator. In December, 1887, he entered the cabinet of M. Tirard as minister of public works, but retired with his colleagues in April following. On February 29, 1892, he became premier by appointment of President Carnot, who was his personal friend, succeeding M. de Freycinet. He himself took the portfolio of the interior. Reelected to the senate, he was chosen president of that body in 1896 and again in 1898. On February 16, 1899, occurred the sudden death of President Félix Faure, and two days later the national assembly, comprising both houses of parliament, met in joint session and on the first ballot chose M. Loubet as president of the republic. His presidency strengthened the republic, and became marked by an almost total disappearance of the Monarchists as a party.

LOUIS I., or as a German name Ludwig, surnamed *Le Débonnaire*, or the Pious, the son of Charlemagne, born in 778, succeeded his father in 814 as king of the Franks and emperor of the West. He died in 840. He was succeeded as emperor by his son Lothaire I.; and by the treaty of Verdun in 843 his son Charles the Bald obtained the territories from which France as a separate nationality developed; while another son, Louis the German, obtained territories from which the distinctive German nationality developed.

LOUIS VII. of France (counting from the above Louis I.), born in 1120, succeeded his father Louis VI. in 1137. He joined the second crusade to Palestine in 1147, but returned two years afterward, having suffered many disasters and lost most of his men. He died in 1180, and was succeeded by his son Philip Augustus.

LOUIS IX. (St. Louis), King of France, eldest son of Louis VIII., born in 1215, succeeded to the throne in 1226. In the year 1244, when sick of a dangerous disorder, he made a vow to undertake a crusade to Palestine; and in August, 1248, sailed with his wife, his brothers, and 80,000 men to Cyprus, and in the following year proceeded to Egypt. Landing at Damiatta, in 1249, he took this city, and afterward twice defeated the Sultan of Egypt, to whom Palestine was subject. But famine and contagious disorders soon compelled him to retreat; his army was almost entirely destroyed by the Saracens, and himself and his followers carried into captivity. In 1270 he determined to undertake another crusade. He sailed to Africa, besieged Tunis, and took its citadel. But a contagious disorder broke out, to which he

himself (1270), together with a great part of his army, fell a sacrifice. In 1297 he was canonized by Boniface VIII.

LOUIS XI., King of France, eldest son of Charles VII., was born in 1423, and on his father's death in 1461 he assumed the crown. In 1481 Louis, who had been twice affected by apoplexy, haunted by the fear of death, shut himself up in his castle of Plessisles-Tours, and gave himself over to superstitious and ascetic practices. He died in 1482. The great object of Louis was the consolidation of France, the establishment of the royal power, and the overthrow of that of the great vassals, and in achieving this end he was very successful, although by most unscrupulous means. He encouraged manufactures and trade, and did much for the good of his kingdom, but was cold-hearted, cruel, and suspicious. Louis XI. was the first French monarch who assumed the title of Most Christian King, given him by the pope 1469.

LOUIS XII., King of France from 1498 to 1515, was born in 1462. He was the son of Charles, duke of Orleans, grandson of Charles V. He divorced his first wife Jeanne, daughter of Louis XI., and married the widow of Charles VIII., thus uniting the Duchy of Brittany with the crown. At the age of fifty-three he married a second wife, Mary, the sister of Henry VIII. of England, and died about three months afterwards (1515) without male issue. He was succeeded by Francis I.

LOUIS XIII., King of France, surnamed the Just, the son of Henry IV., born 1601. He ascended the throne (1610) after the murder of his father, his mother (Maria de' Medici) being made guardian of her son and regent of the kingdom. In 1614 Louis was declared of age, and married the year following Anne, daughter of Philip III. of Spain. Louis gave himself up to the guidance of Cardinal Richelieu. He died in 1643.

LOUIS XIV., King of France, known as Louis the Great, son of Louis XIII. and Anne of Austria, was born at St. Germain-en-Laye 1638, and succeeded his father in 1643. In 1659 peace was



Louis XIV.

concluded with Spain, and Louis married Maria Theresa, daughter of Philip IV. of Spain. On the death of Mazarin in 1661 Louis resolved to rule without a minister. He reformed the administration and the taxes, and made the famous Colbert superintendent, who ac-

complished a series of financial reforms, created the Company of the Indies, made roads, canals, and founded manufactures. In 1672 he declared war with Holland, and in a few weeks he had conquered three provinces; but the formation of the Grande Alliance between the Emperor, William of Orange, Spain, Denmark, etc., checked his ambition. Still the Treaty of Nimeguen (1678) left Louis in possession of Franche-Comté and a part of Flanders. Maria Theresa having died in 1683, he secretly married Madame de Maintenon about 1684 or 1685. The League of Augsburg was now formed against Louis by Spain, Holland, England, Sweden, etc. A general war continued with frequent and severe losses to the French till the Peace of Ryswick (1697), by which Louis was to restore all his recent conquests and most of the acquisitions made since the Peace of Nimeguen. The question of the Spanish Succession once more brought Louis into conflict with a united Europe. The principal episodes of the war were the victories of Blenheim, Ramillies, and Malplaquet, gained by Marlborough and Prince Eugene. Hostilities were terminated by the Peace of Utrecht in 1713, without altering the relative position of the combatants. Louis died on the 1st of September, 1715, and was succeeded by his great-grandson Louis XV.

LOUIS XV., the great-grandson of Louis XIV., was born 1710; commenced his reign in 1715, but did not actually assume the government himself till 1723. In 1726 Louis placed his tutor Cardinal Fleury at the head of the administration. In 1725 he had married Maria, daughter of Stanislaus Leczynski, the dethroned king of Poland. After 1748 Louis began to sink into the grossest indolence and sensuality, abandoning the management of state affairs to Madame de Pompadour, who recklessly squandered the public money. From 1769 he was governed by Madame du Barry, who is said to have cost the royal treasury in five years 180,000,000 livres. The Seven Years' war (1756-63), in which France was involved, brought severe losses and humiliations on the country, and transferred to Great Britain Canada, Cape Breton, and other territories. Louis died in 1774 of smallpox, leaving a debt of \$800,000,000 and a demoralized kingdom.

LOUIS XVI., King of France, grandson of Louis XV., was born 1754, and in 1770 married Marie Antoinette of Austria. He ascended the throne in 1774. His weakness and want of decision made him unfit to rule a great country at a critical period. In 1789, all the grievances and discontents which had been gathering during a long period of misrule found vent; the populace attacked and destroyed the Bastille; and the revolution was accomplished. On January 16, 1793, he was declared guilty of a conspiracy against the freedom of the nation, by a vote of 690 out of 719; on the 17th he was condemned to death, by a majority of only five in 721, and on the 21st he was guillotined.

LOUIS XVII., King of France, second son of Louis XVI., was born in 1785. On the death of his elder brother in 1789

he became dauphin, was proclaimed king by the royalists on the death of Louis XVI. He died in 1795.

LOUIS XVIII., King of France, third son of the dauphin, the son of Louis XV., was born in 1755, and died 1824. At the accession of his brother Louis XVI. in 1774 he received the title of Monsieur. After the death of Louis XVI. Monsieur proclaimed his nephew King of France as Louis XVII., and in 1795 he was himself proclaimed by the emigrants King of France and of Navarre. For many years he led a wandering life, supported by foreign courts and by some friends of the house of Bourbon. He at last took refuge in England in 1807, and lived there till the fall of Napoleon opened the way for him to the French throne. He entered Paris in May, 1814; had to fly on Napoleon's escape from Elba, but was replaced on the throne by the Allies after Waterloo.

LOUIS, St., a city of the United States See St. Louis.

LOUIS D'OR (lō-ē-dor), or simply Louis, a gold coin of France, first struck in 1640, in the reign of Louis XIII., and continuing to be coined till 1795. In 1810 the louis d'or was replaced by the napoleon of 20 francs, and when the coin was again struck under the restoration the same value (20 francs) was retained.

LOUISIANA (lō-iz-i-an'a), one of the southern United States of America, bounded north by Arkansas, northeast and east by Mississippi, from which it is partly separated by the river of that name, southeast and south by the Gulf of Mexico, and west by Texas, from which it is separated chiefly by the Sabine. It has an area of 48,720 sq. miles. The surface is generally flat and low; the delta of the Mississippi, and the land along that river, having to be protected from inundation by levées or artificial embankments. The coast is a low swampy



Seal of Louisiana.

region producing large quantities of rice and sugar-cane; toward the north and northwest, where the highest elevation is reached, the land is less productive, but bears valuable timber. The chief rivers are the Mississippi, which runs for about 600 miles along the border of and through the state; the Red river, which crosses the state diagonally and forms an important avenue of inland commerce; the Washita, Sabine, Pearl, etc., all navigable. There are also numerous "bayous" or secondary outlets of the

rivers of much importance for both navigation and drainage purposes, the chief of which are the Atchafalaya with its series of lakes, the bayou Teche, bayou de Large, bayou La Fourche, and bayou Bœuf. Numerous lakes and lagoons are scattered over the state, mostly land-locked bays and expansions of rivers. The climate is semi-tropical, and the rain-fall heavy along the coast. Coal, iron, sulphur, and rock-salt are found; the chief agricultural products are cotton, sugar, rice, corn, and tobacco. Louisiana ranks second among the gulf states in the total value of its fisheries. The Louisiana forests are exceeded in area and value by those of but few states. The most valuable variety is the long leaf pine. There are also very extensive areas of short leaf pine, intermixed with deciduous varieties. The dense and heavy cypress forests in the deltaic regions as yet have been scarcely touched. The port of New Orleans is the most important one on the Southern coast of the United States and is exceeded only by New York and Boston in the amount of its foreign trade.

Free education is established, and the University of Louisiana, at Baton Rouge, and other institutions are devoted to the higher education. There are about 3000 miles of railway. The capital is Baton Rouge, but New Orleans is much the largest town. Louisiana became a state in 1812, the territory now included within its limits having previously belonged to France and Spain, and having been acquired by purchase from Napoleon I. The earliest historical record of explorations by white men, is 1541, when De Soto, the Spanish explorer, landing on the Florida coast, made his way through trackless forests and swamps to the Mississippi. Marquette and Joliet in 1673 descended the Mississippi to the mouth of the Arkansas, and in 1682 Robert Cavelier de La Salle navigated the great river from the Illinois to the Gulf of Mexico. The early settlements proved unsuccessful, and it was not until 1700 that the French, under the leadership of Iberville, founded a permanent colony. Under the treaty of Utrecht the territory of Louisiana, which nominally extended over the whole valley of the Mississippi, and westward to the Pacific, or at least to the Rocky mountains, passed into the hands of France. New Orleans was founded in 1718, and the territory, at first governed by a French appointee, came into the jurisdiction of John Law, the originator of the great Mississippi scheme. In 1762, Spain acquired the province by a secret treaty with France, but did not take full possession until 1769. In 1763 all of Louisiana east of the Mississippi, from its source to the river Iberville, was ceded to Great Britain and counted with Florida. By the treaty of 1783, which closed the war with Great Britain, the newly constituted United States came into possession of the eastern bank of the Mississippi south as far as the thirty-first parallel, while Spain held the other bank, and claimed complete possession of the river south of the thirty-first parallel. Spain

ceded this territory back to France in 1800, and three years later Napoleon Bonaparte, being unable to hold the country himself, and desirous of damaging Great Britain, sold the whole country to the United States for \$12,000,000. The arrangement was made by Thomas Jefferson, and he was denounced on all hands for his alleged unconstitutional action in making the bargain.

In 1804 a territory known as Orleans was formed, including most of what now is called Louisiana, and in 1812 the state was admitted to the union with its present boundaries. On January 8, 1815, was fought the great battle of New Orleans, when General Jackson at the head of some raw levies of Tennessee and Mississippi militia defeated General Pakenham and his peninsular regulars. Louisiana advanced rapidly in material prosperity during the forty-five years from this time until the outbreak of the civil war, and New Orleans became the most important port of the south, and the center of the cotton-shipping trade. The state went with the south and seceded from the union in December, 1860. It became the theater of war by land and river, and in April, 1862, Admiral Farragut passed the forts and compelled the surrender of the city. From this time on the federal forces practically controlled Louisiana. The state passed through a stormy time in the days of reconstruction, and it was not until 1877 that its administration was rescued from the hands of the carpet bag element. By the so-called grandfather clause in the constitution of 1898 which laid down the qualification for suffrage, the vast majority of the negroes were disfranchised. In 1900 out of 150,000 registered votes it was estimated only 7000 were colored, though the negro population almost equals the white.

In national politics Louisiana has been democratic, republican, and democratic except in 1840 and 1848, when it voted for the whig candidates and 1876 when its electoral vote was given by the electoral commission to Hayes. Since then it has invariably been Democratic. Pop. 1909, 1,700,000, about a half being colored.

LOUISIANA PURCHASE, the purchase by the United States from France in 1803 of the "Province of Louisiana." In 1802 news reached the United States that Spain had retroceded Louisiana to France. President Jefferson declared that the day she took possession the ancient friendship between the United States and France would be at an end, and the United States must henceforth ally itself with the British nation. The war between France and England had just been renewed, and Napoleon doubled the ability of France to hold Louisiana and therefore, proposed to sell the entire Province of Louisiana, and asked for an offer. The price finally agreed upon was 80,000,000 francs, including 20,000,000 for the debts which the United States was to assume. The total cost of Louisiana, principal, interest, and debts assumed, was \$27,267,621. The area purchased exceeded 1,000,000 square miles. The population did not exceed 90,000, including about 40,000 slaves. The rest of the population con-

sisted of French, Spanish creoles, Americans, English, and Germans.

LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, a State institution at Baton Rouge, La., chartered in 1877. The Agricultural and Mechanical College, opened at New Orleans in 1874, was merged with the University in 1877. In 1886 the United States Government gave the use of the buildings and grounds of the military garrison at Baton Rouge, and in 1902 the full title to the property was vested in the institution. The courses offered are literature, Latin-scientific, general science, commerce, agriculture and sugar-raising, mechanical and civil engineering. The degrees conferred are B. A., B. S., M. S., C. E., M. E., and M. A. The university has three experiment stations, at New Orleans, Baton Rouge and Calhoun. The discipline is military.

LOUIS NAPOLEON. See Napoleon III.

LOUIS PHILIPPE, King of the French, born at Paris 1773; died at Claremont, England, 1850. He was the eldest son of Duke Louis Philippe Joseph of Orleans, surnamed Egalité (see Orleans), and during his father's lifetime he was known as Duke of Chartres. He entered the army in 1791, and favoring the popular cause in the revolution he took part in the battles of Valmy and Jemappes; was present at the bombardment of Venloo and Maestricht, and distinguished himself at Neerwinden. Dumouriez had formed a scheme for placing him on the throne as a constitutional monarch, and being included in the order of arrest directed against Dumouriez, in 1793, he took refuge within the Austrian territory. For twenty-one years he remained exiled from France, living in various European countries, and in America. He had become Duke of Orleans on the death of his father in 1793, and in 1809 he married the daughter of Ferdinand IV. of Naples. After the fall of Napoleon I. he returned to France, and was reinstated in his rank and property. At the revolution of July, 1830, he was made "lieutenant-general of the kingdom," and in August became king of the French. He reigned for eighteen years, when the revolution of 1848 drove him from the throne to England where he remained till his death.

LOUISVILLE (lō'i-vil or lō'is-vil), the commercial capital of Kentucky and county seat of Jefferson county, on the south bank of the Ohio, immediately above the falls. It has a river frontage of 8 miles, and is connected with the towns of New Albany and Jeffersonville on the opposite bank of the river, in the state of Indiana, by a bridge 5218 feet long. A canal 2½ miles long carries the river traffic round the falls or rapids. In addition to the river traffic an enormous trade is carried on by railway, tobacco, whisky, pork, and flour being among the chief articles. The manufactures are important and varied. The principal public buildings are a fine court-house, the city-hall, the public library, the jail, a custom-house, and four spacious market-houses, besides churches, asy-

lums, and literary and scientific institutions. There are four medical colleges. An artesian well 2066 feet deep, having a daily flow of 330,000 gallons, forms part of the city water-works. Pop. 1909, estimated at 275,000.

LOUSE, the common name of insect parasitic on man and other animals. The common louse is furnished with a simple eye or ocellus, on each side of a distinctly differentiated head, the under surface of which bears a suctorial mouth. There is little distinction between the thorax and abdomen, but the segments of the former carry three pairs of legs. The legs are short, with short claws or with two opposing hooks, affording a very firm hold. The body is flattened and nearly transparent, composed of eleven or twelve distinct segments. The

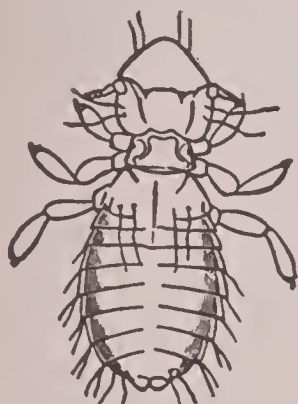


Fig. 1. Hen-louse.

young pass through no metamorphosis, and their multiplication is extremely rapid. Most, if not all, mammals are infested by lice, each having generally its own peculiar species, and sometimes having two or three. Three species are



Fig. 2. Body-louse.

said to belong to man, viz.: body-louse, head-louse, and crab-louse.

LOUTH, the smallest county in Ireland, in the province of Leinster, comprising 204,123 acres. Pop. 65,741.

LOUVOIS (lô-vwa), François Michel Letellier, Marquis de, minister of war to Louis XIV., born at Paris 1641, died 1691. He effected quite a revolution in the art of disciplining, distributing, equipping, and provisioning armies, and his administration was brilliant. It was partly by his advice that the Edict of Nantes was revoked in 1685, and the Palatinate was devastated in 1689. Louvois's organization of the army lasted till the Empire; but he also undid the work of Colbert, and destroyed the commerce of France.

LOUVRE (lô-ver), a dome-turret rising from the roof of a hall or other apartment, formerly open at the sides, but now generally glazed. Louvres were

originally intended to allow the smoke to escape when the fire was kindled in the middle of the room. Louvre window is the name given to a window in a



Louvre.

church tower, partially closed by slabs or sloping boards or bars called louvre boards (corrupted into luffer or lever boards), which are placed across to exclude the rain, while allowing the sound of the bell to pass.

LOUVRE, the old royal palace at Paris, said to have been a royal residence in the reign of Dagobert, 628. Francis I. erected that part of the palace which is now called the old Louvre, and the buildings have been enlarged and adorned by successive kings, particularly Louis XIV. The new Louvre begun by Napoleon I. was completed by Napoleon III. in 1857. The whole group of buildings is distinguished by its great extent, and by its elegant and sumptuous architecture. It contains museums of paintings, drawings, engravings, bronze antiques, sculptures, ancient and modern, together with special collections of antiquities, and an ethnographical collection. It was greatly injured by the Communists in May, 1871, the Richelieu pavilion, containing the imperial library of 90,000 volumes and many precious MSS., having been entirely destroyed.

LOVE-BIRD, a name given to a genus of the parrot family. They are a beautiful group consisting of very diminutive



Love-bird.

species, found in America, Africa, and Australia. They receive their name from the great attachment shown to each other by the male and female birds.

LOVEJOY, Elijah Parish, was born in Maine in 1802. He became a Presbyterian minister and edited the St. Louis Observer and other abolitionist papers.

Aroused by burning of a negro murderer he wrote an editorial that excited the wrath of the pro-slavery element. He removed his press to Alton, Ill., where it was seized by a mob and thrown into the river. Several other presses which he secured were destroyed. A mob again attacked his office at midnight on November 7, 1837, and an attempt being made to set fire to the building, Lovejoy stepped out and was shot.

LOVEJOY, Owen, brother of the foregoing, was born in Albion, Me., in 1811. He was pastor of a Congregational church in Illinois; was present when his brother was murdered, and was often fined for holding anti-slavery meetings. He served in the Illinois legislature, and from 1856 until his death sat in congress as a republican. He died in 1864.

LOW, Seth, American educator and administrator, was born in Brooklyn in 1850. In 1882 he was elected mayor of Brooklyn on an independent ticket. His administration was characterized by his application of the civil-service system to city offices and the impartial maintenance of efficient service among appointees. In 1884 he was elected to a second term. In 1890 he was elected to the presidency of Columbia College. He made to the university a gift of \$1,000,000, to be used for the erection of a library building. In 1897 he received 150,000 votes as independent candidate for mayor of New York City. He was a member of the American delegation to the Czar's Peace Conference at The Hague in 1899, and at various times held other posts of public trust. In 1901 he was elected mayor of New York City. He was a founder and the first president of the Bureau of Charities of Brooklyn, and was elected vice-president of the New York Academy of Sciences and president of the American Archaeological Institute. His academic dignities include, among others, the degree of LL.D., conferred by the University of the State of New York, Harvard, and Princeton.

LOVER, Samuel, novelist, poet, and musical composer, was born in Dublin, in 1797, and died in 1868. Among his works are *Legends and Stories of Ireland* (1832-34); *Rory O'More*, a novel (1837); *Songs and Ballads* (1839); *Handy Andy*, a novel (1842); *Treasure Trove*, a novel (1844). *The Angels' Whisper*, *Molly Bawn*, and *the Low-backed Car* are among his most popular songs.

LOW CHURCH, a name given to a section of the Church of England whose opinions are opposed to those of the High Church party, and are especially hostile to ritualism and sacerdotalism. See High Church.

LOW COUNTRIES. See Netherlands.

LOWE (lô), Sir Hudson, lieutenant-general in the British army; born at Galway 1769, died 1844. On the fall of Napoleon he was appointed governor of St. Helena, and intrusted with the care of the ex-emperor.

LOW'ELL, a city in Massachusetts, on the right bank of the Merrimac, 25 miles n.n.w. from Boston, neatly and substantially built of brick, and chiefly remarkable for being a leading seat of the cotton manufacture. There are also extensive bleacheries, large machine-

shops, paper and chemical works, etc. Its machinery is largely driven by water-power supplied by the Merrimac, which here falls 33 feet. Seven railways center in the place. Pop. 1909, about 100,000.

LOWELL, James Russell, American author, born in 1819 at Cambridge, Massachusetts. In 1855 succeeded Longfellow as professor of modern languages and belles-lettres at Harvard. From 1857 to 1862 he wrote many essays for the *Atlantic Monthly*, founded by Holmes, Longfellow, Emerson, and himself, and of which he was the first editor. He was joint-editor of the *North American Review* from 1863 to 1872. In 1877 he was appointed American minister at Madrid, and in 1880 he was transferred to London, whence he was recalled in 1885. He was very popular in Britain, was made D. C. L. of Oxford, LL.D. of Cambridge, and rector of St. Andrews University. He died in 1891. Besides his poems, of which numerous editions have been published, and the *Biglow Papers*, his chief works are: *Conversations on some of the Old Poets*; *Among my Books*;



J. M. Lowell

My Study Windows; *Democracy*, and other Addresses, etc. His first wife, Maria White Lowell (1821-1853), was a poet of considerable merit; a volume of her poems was privately printed after her death.

LOYOLA, Ignatius, original name Inigo Lopez de Recalde, the founder of the order of the Jesuits, was born at the castle of Loyola, Guipuscoa, in 1491, died 1556. When still a young man he entered the army, and during the defense of Pampeluna in 1521 against the French he was severely wounded, and a long and tedious confinement was the result. The only books he found to relieve its tedium were books of devotion and the lives of saints. This course of reading induced a fit of mystical devotion in which he renounced the world, made a formal visit to the shrine of the Virgin at Montserrat, and vowed himself her knight (1522). After his dedication he made a pilgrimage to Rome and Jerusalem, and from 1524 to 1527 at-

tended the schools and universities of Barcelona, Alcalá, and Salamanca. In 1528 he went to Paris, where he went through a seven years' course of general and theological training. Here in 1534



Ignatius Loyola.

he formed the first nucleus of the society which afterward became so famous, François Xavier, professor of philosophy Lainez, and others having in conjunction with Loyola bound themselves together to devote themselves to the care of the church and the conversion of infidels. Rome ultimately became their headquarters, when Loyola submitted the plans of his new order to Paul III., who under certain limitations, confirmed it in 1540. (See Jesuits.) Loyola continued to reside in Rome and govern the society he had constituted till his death. He was beatified in 1607 by Paul V., and canonized in 1622 by Gregory XV.

LOZERE (lo-zâr), a department of Southern France, bounded by Haute-Loire, Cantal, Ardèche, Gard, and Aveyron; area, 1996 sq. miles. The capital is Mende. Pop. 128,866.

LUBECK (lû'bek), one of the free towns of Germany, and a constituent of the German empire, stands on a low ridge at the confluence of the Wackenitz with the Trave, 38 miles northeast of Hamburg, and 12 miles from the Gulf of Lübeck, a bay of the Baltic. Pop. of the town, 82,098; of the territory, 96,775.

LUBLIN, a town of Russian-Poland, capital of the government of Lublin, 60 miles southeast of Warsaw. Pop. 53,137. —The government has an area of 6499 sq. miles; pop. 931,597.

LUBRICANT, any substance applied to surfaces that work against each other, to diminish friction. Lubricants may be either solid, semi-liquid, or liquid. Plumbago, grease, animal, vegetable, and mineral oils, simple or variously compounded, are the substances used.

LUCAN, George Charles Bingham, Earl of, born 1800, died 1888. His name is conspicuously associated with the Balaklava charge of the Light Brigade. He was lieutenant-general in 1858; general in 1865; and field-marshal in 1887.

LUCCA, a town of Italy, capital of a province of same name, stands near the left bank of the Serchio, 37 miles n.n.w. Florence. Pop. 72,971. The province of Lucca is bound n. by Massa e Carrara and Modena, e. by Firenze, s. by Pisa, w.

by the Mediterranean; area, 577 sq. miles. Pop. 318,610.

LUCE, Stephen Bleecker, American naval officer, born in 1827 in Albany, N. Y. He entered the United States Navy in 1841, was commissioned lieutenant in 1855, and in 1862 as lieutenant commander aided in the blockade of South Carolina ports, participating in the battles of Hatteras Inlet and Port Royal. In 1872 he became captain, in 1881 commodore, and in 1885 rear-admiral. From 1884 to 1886 he was president of the United States Naval War College, of which he was a founder, and in 1889 he was retired. In 1892 he represented the United States as commissioner-general at the Columbian celebration held at Madrid to commemorate the four hundredth anniversary of the discovery of America. He died in 1905.

LUCERNE, Luzern (lô-tern, 'lô'tern), a city of Switzerland, capital of a canton of the same name, beautifully situated on the margin of Lake Lucerne and on the Reuss. The "Lion of Lucerne," a monument by Thorwaldsen to the Swiss guards who fell in Paris in 1792 while defending the Tuileries, and the glacier-garden, containing relics of the ice period are objects of interest. Pop. 29,633. —The canton is bounded by the cantons of Aargau, Zug, Schwyz, Unterwalden, and Bern; area, 587 square miles. Pop. 146,474.

LUCERNE, Lake of, a Swiss lake bounded by the cantons of Uri, Schwyz, Unterwalden, and Lucerne, and noted for its magnificent scenery and historical associations.

LUCIA, St., one of the British West India Islands, about 80 miles northwest of Barbadoes; area about 240 sq. miles. Pop. 49,895, of whom about 1000 are white.

LUCIFER, a name anciently given to the planet Venus as the morning star. The term is used figuratively by Isaiah (xiv. 12) and applied to the Babylonian king, but it was mistaken by the commentators for a reference to Satan.

LUCIFER-MATCH. See Matches.

LUCKNOW, a city of Hindustan, capital of Oude, 610 miles w. n. w. of Calcutta, on both banks of the Gumti, here crossed by four bridges, two of which were built by native rulers, and two by the British since 1856. Lucknow was one of the chief scenes of the Sepoy mutiny. At the beginning of the mutiny the Residency was fortified by Sir Henry Lawrence, and after his death (4th July, 1857) it was closely besieged by the rebels till relief was brought by Havelock and Outram. The relieving force was only a small one, however, and the British were again besieged, partly in the Residency, partly in a walled garden called the Alambagh. In the middle of October Sir Colin Campbell gained possession of the place after severe fighting, but as it seemed impossible to hold it with the troops at his disposal he left Sir James Outram to defend the Alambagh, and removed the civilians, women and children to Cawnpore. At last, in March 1858, Sir Colin returned with a sufficient force, completely defeated the rebels, and permanently recovered the town. Population, 264,049.

LUCRETIA, in Roman legendary history, a lady of distinguished virtue who was outraged by Sextus, son of Tarquinius Superbus, king of Rome. She stabbed herself, and her death was the signal for a revolution, by which the Tarquins were expelled from Rome and a republic formed.

LUCRETIUS, Carus, Titus, Roman philosophic poet, born about 98 B.C., died 55 B.C. He is said to have died by his own hand, but about his life almost nothing is known. He is admitted to be one of the greatest of Roman poets for descriptive beauty and elevated sentiment. We possess of his composition a didactic poem, in six books, *De Rerum Natura* (On the Nature of Things), in which he exhibits the cosmical principles of the Epicurean philosophy.

LUDLOW, William, American soldier, was born at Islip, Long Island, N. Y., in 1843. He graduated at West Point in 1864, and served under General Hooker in the Atlanta campaign as chief engineer of the Twentieth Army Corps, Army of the Cumberland. He was assistant engineer to General Sherman's army during the famous "march to the sea." In May, 1898, on the outbreak of the Spanish-American war, he was appointed brigadier-general of volunteers. In December, 1898, he was appointed military governor of Havana. On May 1, 1900, he was relieved, having previously, however (in January), been promoted to be brigadier-general in the regular army, the first engineer since the civil war to receive a line brigadier-generalship. He died in 1901.

LUDWIGSHAFEN (lud'vihs-hä-vn), a town of Rhenish Bavaria, on the left bank of the Rhine. Pop. 61,905.

LUGGER, a vessel having either two or three masts and a running bowsprit,



Lugger.

the masts carrying each one or two lug-sails. There are also two or three jibs.

LUGO, a town of Northern Spain, capital of province of same name, Pop. 25,568.—The province has an area of 3788 sq. miles; pop. 465,386.

LUKE, ST., the evangelist, author of the Gospel which bears his name and of the Acts of the Apostles. He was probably born at Antioch in Syria; was taught the science of medicine, but the tradition that he was also a painter is doubtful. The date of his conversion is uncertain; he is supposed to have been one of the seventy disciples, and also one of the two who journeyed to Emmaus with the risen Savior. He was for several years a companion of the

apostle Paul in his travels, so that in the Acts of the Apostles he relates what he himself had seen and participated in. (See Acts of the Apostles.) Luke is apparently mentioned three times in the New Testament: Col. iv. 14; 2 Tim. iv. 11; Philem. 24. He lived to an advanced age, but whether he suffered martyrdom or died a natural death it is impossible to determine. The Gospel of St. Luke was written probably about 58-60. It is addressed to a certain Theophilus, and records various facts connected with the early life of Jesus which were probably furnished to the writer by Mary herself. It is first quoted by the church writers Justin Martyr and the author of the Clementine Homilies, and at the time of Irenæus and Tertullian the gospel in its present form was fully accepted. See Gospel.

LULLY, Jean Baptiste, musical composer, born at Florence 1633, died at Paris, 1687. In 1672 he had the direction of the Royal Academy of Music, from which time dates the foundation of the grand opera. His fame now chiefly rests on his overtures, a species of composition of which he is said to have been the inventor.

LUMBA'GO, rheumatism or rheumatic pains affecting the lumbar region, and often disabling a person. See Rheumatism.

LUMBER, the common term in North America for timber sawn up for market, including laths, deals, planks, shingles, etc.

LUMINIFEROUS ETHER, a hypothetical medium of extreme tenuity and elasticity, supposed to be diffused throughout all space, as well as among the molecules of which solid bodies are composed, and to be the medium of the transmission of light, heat, and other forms of energy. From the extreme facility with which bodies move about in this medium it might be called a fluid; but the undulations which it serves to propagate are not such as can be propagated by fluids. Its elastic properties are rather those of a solid; and its waves are analogous to the pulses which travel along the wires of a piano rather than to the waves of extension and compression by which sound is propagated through air. See Undulatory Theory.

LUMINOSITY. See Flame and Phosphorescence.

LUNA, the Latin name for the moon, among the Greeks Selēnē. Her worship is said to have been introduced among the Romans in the time of Romulus.

LUNACY. See Insanity.

LUNACY, in law. Lunatics are not legally responsible for their acts, but before the law, all persons are considered sane until the contrary is proved. When the plea of lunacy is sustained the person accused is acquitted of guilt and kept in custody.

LUNAR CAUSTIC, nitrate of silver. See Silver.

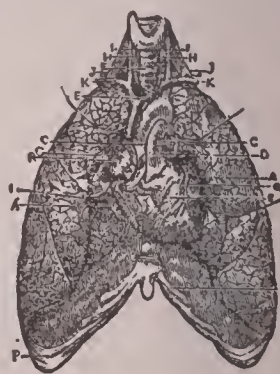
LUNAR THEORY, the mathematical treatment of perturbations in the moon's motion due to the attraction of the sun, the earth, and the planets.

LUNAR YEAR. See Year.

LUNATIC ASYLUMS, houses established for the treatment of insane per-

sons. Some are established by law, others by the endowments of charitable donors, while others are private establishments. Until near the close of the 18th century many lunatics were allowed to wander at large, exposed to all the arbitrary cruelty to which their defenseless condition made them liable, while those who were confined in asylums were in a still worse case. Chains, whipping, and confinement in dark dungeons were among the ordinary discipline of these establishments. The reformation of this unnatural system was begun in France by Philippe Pinel, a benevolent physician; and in England a parliamentary inquiry in 1815 into the barbarities hitherto practiced in lunatic asylums led to a slow but gradual improvement. Lunatic asylums, whether public or private, are now under the control of officers appointed under special statutes, and lunatics must be visited at least once a year by medical and legal advisers. The general conduct of lunatic asylums is now brought more into harmony with humanity and common sense. Violence and undue coercion have been generally abandoned, and persuasion and address are relied on for the control of the patients. Religious services are provided, and recreations of various kinds are also commonly and sometimes freely provided.

LUNGS, the sole breathing organs of reptiles, birds, mammals, and in part of amphibians (frogs, newts, etc.), the latter forms breathing in early life by branchiæ or gills, and afterward partly or entirely by lungs. The essential idea of a lung is that of a sac communicating with the atmosphere by means of a tube, the trachea or windpipe, through which air is admitted to the organ, and



Human lungs, heart and great vessels.

A, Lungs with the anterior edges turned back to show the heart and bronchi. B, Heart. C, Aorta. D, Pulmonary artery. E, Ascending vena cava. F, Trachea. G G, Bronchi. H H, Carotid arteries. I I, Jugular veins. J J, Subclavian arteries. K K, Subclavian veins. P P, Costal cartilages. Q, Anterior cardiac artery. R, Right auricle.

through structural peculiarities to its intimate parts, the air serving to supply oxygen to the blood and to remove carbonic acid. In the Mammalia, including man, the lungs are confined to and freely suspended in the cavity of the thorax or chest, which is completely separated from the abdominal cavity by the muscular diaphragm or "midriff." In man the lungs are made up of honeycomb-like cells which receive their supply of air through the bronchial tubes,

If a bronchial tube is traced it is found to lead into a passage which divides and subdivides, leading off into air-cells. The walls of these air-cells consist of thin, elastic, connective tissue, through which run small blood-vessels in connection with the pulmonary artery and veins. By this arrangement the blood is brought into contact with, and becomes purified by means of the air. The impure blood enters at the root of the lung through the pulmonary artery at the right side of the heart, and passes out purified through the pulmonary veins toward the left side of the heart. Both lungs are inclosed in a delicate membrane called the pleura, which forms a kind of double sac that on one side lines the ribs and part of the breast-bone, and on the other side surrounds the lung. Pleurisy arises from inflammation of this membrane. The lungs are situated one on each side of the heart, the upper part of each fits into the upper corner of the chest, about an inch above the collar-bone, while the base of each rests upon the diaphragm. The right lung is shorter and broader than the left, which extends downward further by the breadth of a rib. Each lung exhibits a broad division into an upper and lower portion or lobe, the division being marked by a deep cleft which runs downward obliquely to the front of the organ; and in the case of the right lung there is a further division at right angles to the main cleft. Thus the left lung has two, while the right lung has three lobes. These again are divided into lobules which measure from $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter, and consist of air-cells, blood-vessels, nerves, lymphatic vessels, and the tissue by which the lobules themselves are bound together. The elasticity of the lungs by which they expand and expel the air is due to the contractile tissues found in the bronchial tubes and air-cells, this elasticity being aided by a delicate, elastic, surface-tissue. (See Respiration.) The lungs are popularly termed "lights," because they are the lightest organs in the body, and float when placed in water, except when they are diseased; a characteristic this which is applied in medical jurisprudence as a test whether an infant has respired or not. Among the diseases which affect this organ are pleurisy, pneumonia, pleuro-pneumonia, consumption, etc. See those terms.

LUPULIN, the fine yellow powder of hops, which contains the bitter principle. It consists of little round glands, which are found upon the stipules and fruit, and is obtained by drying, heating, and then sifting the hops. It is largely used in medicine.

LUPUS, in medicine, a slow non-contagious tubercular affection, occurring especially about the face, and commonly ending in ragged ulcerations of the nose, cheeks, forehead, eyelids, and lips.

LURAY CAVERN, a remarkable cavern in the state of Virginia, near the village Luray. It contains many chambers, and is exceedingly rich in stalactite formations.

LUTE, a stringed musical instrument of the guitar kind, formerly very popular in Europe. It consists of four parts,

viz.: the table or belly with a large sound-hole in the middle; the body, ribbed like a melon, having nine or ten ribs or divisions; the neck, which has nine or ten stops or frets which divide the strings into semitones; and the head or cross, in which are fitted the pegs or screws for tuning the strings, of which there are five or six pairs, each pair tuned in octaves or unisons. The strings are struck by the fingers of the right hand and stopped on the frets by those of the left.

LUTHER (lŏ'thër), Martin, the great religious reformer of Germany, was born at Eisleben, November 10, 1483, and died there on the 18th Feb., 1546. In 1501 he entered the University of Erfurt; and in 1505 received the degree of master. About this time he discovered in the library of the university a Latin Bible and found, to his no small delight, that it contained more than the excerpts in common use. Contrary to the wishes of his father he entered the monastery of the Augustines at Erfurt in 1505. In 1507 he was consecrated priest, and in 1508, by the influence of his patron, Staupitz, who was provincial of the order, he was made professor of philosophy in the new University of Wittenberg. In 1510 he visited the court of Pope Leo X. at Rome on business connected with the order. Returning to Wittenberg he was made a Doctor of



Martin Luther.

Theology in 1512, and here his profound learning and powerful eloquence drew large audiences. At that time he had no controversy with the pope or the church, but the arrival in 1517 of John Tetzel in Wittenberg selling indulgences for sins roused the fiery energy of Luther, and caused him to draw up his famous protest in ninety-five propositions, which he nailed to the church-door in Wittenberg. The result was that the sale of indulgences ceased, Tetzel fled, and a great religious commotion spread rapidly through Germany. Luther was summoned to Rome to explain his heretical proceedings, but refused to go; nor were the efforts of Cardinal Cajetan able to effect a reconciliation between him and the pope. His dispute with Dr. Eck at Leipzig in 1519, in which he denounced indulgences, and questioned the authority of the pope, was followed in 1520 by a bull of anathema—a document which Luther straightway burned publicly in Wittenberg. This open defiance of Rome required him to vindicate his conduct, which he did in a pamphlet addressed to the Christian Nobles of Germany, with the result that many of the worthiest rallied to his aid. When sum-

moned to appear before the German emperor, Charles V., at the Diet of Worms (1521), Luther appeared, acknowledged his writings, made an eloquent defense, but refused to recant. When he retired in triumph from Worms he was met by a friendly troop of soldiers belonging to Frederick the Elector of Saxony, who conveyed him to the castle of Wartburg, where he lay in concealment for nearly a year. Here he employed his time in translating the New Testament into German, but when he heard that disturbances had been excited in Wittenberg on the question of images, he could no longer bear the restraint of inaction. Returning suddenly, and at great danger to himself, Luther succeeded in quieting the people by means of a wise and patient moderation. In 1524 he laid aside his cowl as a priest of the Roman Church, and in 1525 married Catharina von Bora, one of nine nuns who had renounced their religious vows under his teaching. The wisdom of this marriage was doubted by his friends, but his home-life and the birth of six children, contributed greatly to the happiness of the reformer. From the year 1521 Luther had been busy translating the Bible into German with the aid of Melancthon and others, and the great task was completed in 1534. This important work, taken in connection with the Protestant Confession made at Augsburg in 1530, served to establish the reformer's doctrines in Germany, and closed the important part of his public life. The massive character of the German reformer lay along simple lines, and found its full and direct expression in his work. A vivid practical insight enabled him to mark the abuses of the Roman Church, and his fervid energy urged him to reform them.

LUTHERANS, the adherents of Luther, a term now applied to one of the great sections into which the Protestant Church is divided, the other being known as the Reformed or Calvinists. The doctrinal system of the Lutheran Church is contained in the Augsburg Confession, and other documents, including the two catechisms of Luther. The fundamental doctrine is that we are justified before God, not through any merits of our own, but through faith in His Son. In the eucharist the belief of the Lutherans is known as consubstantiation. Lutheranism extended in the time of its founder over the greater part of Germany, and became also the established religion of Sweden, Norway, and Denmark. The membership of the Lutherans is estimated at 45,000,000. In America they have a membership of about 1,230,000.

LUTRA, a genus of carnivorous animals, comprising the otters.

LUXEMBURG, Grand-duchy of, a small independent state of Western Europe, bounded north and east by Rhenish Prussia, south by France, and west by Belgium; greatest length, north to south, 55 miles; greatest breadth, 34 miles; area, 998 sq. miles. Pop. 236,543.

LUXEMBURG, the capital of the above grand-duchy, 117 miles southeast of Brussels. Pop. 20,928.

LUZON, the largest of the Philippine group of islands. Its greatest length is

about 540 miles; its greatest breadth about 125 miles; area estimated at 57,500 sq. miles. Two great mountain chains, the Sierra Madre and Cordillera de Caravillos, run north and south, and rise to a height in some cases of more than 7000 feet. They are of volcanic origin, and many disastrous eruptions have taken place. Rivers and lakes are numerous. Vegetation is luxuriant, and the vast forests contain ebony, cedar, and other valuable trees. Luzon also produces abundant crops of rice, Manila hemp, tobacco, coffee, ginger, and pepper. There are few wild animals except the buffalo, which is also domesticated; but oxen, sheep, and swine are reared. The population consists of the aboriginal Negritos, and of Malays, Chinese, Spaniards, etc., and the whole is estimated at about 3,400,000. The capital is Manila.

LYCEUM, an academy at Athens in which Aristotle explained his philosophy. In modern times the name of lyceum has been given to the schools intended to prepare young men for the universities.

LYCOPODS, the club-moss tribe, chiefly inhabiting boggy heaths, moors, and woods. They are intermediate in their general appearance between the mosses and the ferns, and are in some respects allied to the Coniferae. The lycopods occur in all parts of the globe, but grow most luxuriantly in tropical or mild climates. In the carboniferous era they attained a very large size, rivalling trees in their height and the thickness of their stems.



Lycopodium Selago. a, Leaf; b, Sporangium in the axil of bract; c, Spores—magnified.

LYCURGUS, the great legislator of the Lacedaemonians, was the son of Eunomus, king of Sparta. His history commences with the year 898 B.C., when he might have usurped the throne on the death of his brother, but preferring to guard the kingdom for the unborn child of the latter, he devoted himself to the study of legislation. On his nephew becoming of age, Lyeurgus traveled into Crete, Egypt, and Asia, and thus prepared himself to give Sparta the laws which have rendered his name immortal. His object was to regulate the manners as well as the government, and to form a warrior nation, in which no private interest should prevail over the public good. It is said that Lyeurgus persuaded the Spartans to swear that they would observe these laws till his return from another journey, and that he then departed, and they never heard of him more. One account states that he starved himself to death, but it is more probable that he retired to private life, and died naturally, as Lucian records, at the age of eighty-five.

LYDDITE, a high explosive, receiving

its name from Lydd in Wales, the place of its first manufacture. It is used as a bursting charge for shells, its reputed destructive power being due to the shock of air-concussion, rather than to the fragments produced by the rupture of the shell. It is supposed to kill by shock, or suffocate by its fumes, every living thing within a radius of twenty-five yards of the bursting-point. It is a very stable compound under changes of temperature, and is said to be fully as effective against masonry as black powder, and twice as effective against sand or earth. It was extensively used against the Boers in the war of 1899-1902, but, owing to the character and conformation of the positions usually selected by the Boers, it did not prove very destructive.

LYE, water impregnated with alkaline salt imbibed from the ashes of wood, or any solution of an alkali used for cleaning purposes, as for types after printing, ink-rollers, etc.



Sir Charles Lyell.

LYELL, Sir Charles, Bart., geologist, born at Kinnordy, Forfarshire, 1797, died in London 1875. His first important work was the *Principles of Geology* (1830-33), and a portion of this book afterward formed the basis of the *Elements of Geology*. Another important work was the *Antiquity of Man* (1863), in which he summarized the evidence in favor of the theory that the race of man was much older than was currently believed. Lyell was knighted in 1848, and made a baronet in 1864. His *Life and Letters* were published in 1881.

LYMPH, in physiology, the fluid resulting primarily from the assimilation of food, and also obtained from the blood and tissues, and which is contained within a system of vessels called lymphatics and lacteals. The clearest and simplest view of the lymphatic system is to consider these vessels as the media through which matters are absorbed from the alimentary canal on the one hand, and from the blood and tissues on the other. The matters so absorbed are elaborated and converted in the lymphatic glands into lymph, a fluid which presents the essential features of the more highly elaborated blood, and which is ultimately poured into the blood mainly through the thoracic duct. Through this system the continual loss which the blood and body suffer is made good. The lymph as it

exists in the lymphatic vessels is a colorless, transparent fluid, destitute of smell. The lymphatic glands are highly important structures, for it is only after passing through them that the lymph is fully elaborated and ready to enter the blood. Their average size is that of a small almond, and they are generally arranged in groups. As distinguished from the lymphatics the lacteals are the vessels by which the chyle is absorbed from the small intestine and elaborated in the lymphatic glands of the mesentery to be afterward poured into the thoracic duct. This duct pours its contents into a large vein at the root of the neck. Lymphatic vessels and glands are numerous throughout the body.

LYNCBURG, a town in Campbell co., Virginia, on James' river, 120 miles west by south of Richmond. It contains iron and brass foundries, a large cotton factory, several flour mills, and extensive tobacco manufactories. Pop. 22,160

LYNCH-LAW, the practice of punishing men for crimes or offenses by private unauthorized persons without a legal trial. The origin of the phrase, used chiefly in the United States has been variously accounted for, but it is evidently derived from some person named Lynch, who adopted a rough and ready mode of punishing offenders.

LYNN, a town in Essex co., Massachusetts, on the north side of Massachusetts Bay, about 10 miles northeast from Boston. The town has some fine public buildings, including the city-hall, music-hall, Oddfellows' hall, etc. Its chief industry is the manufacture of boots and shoes, of which upward of 15,000,000 pairs are stated to be annually made. Pop. 1909, about 88,000.

LYNX, the popular name of several species of feline carnivora, resembling the common cat, but with ears longer and tufted with a pencil of hair, and tail shorter. The lynxes have been long



Lynx.

famed for their sharp sight, which character they probably owe to their habit of prowling about at night and their brilliant eyes.

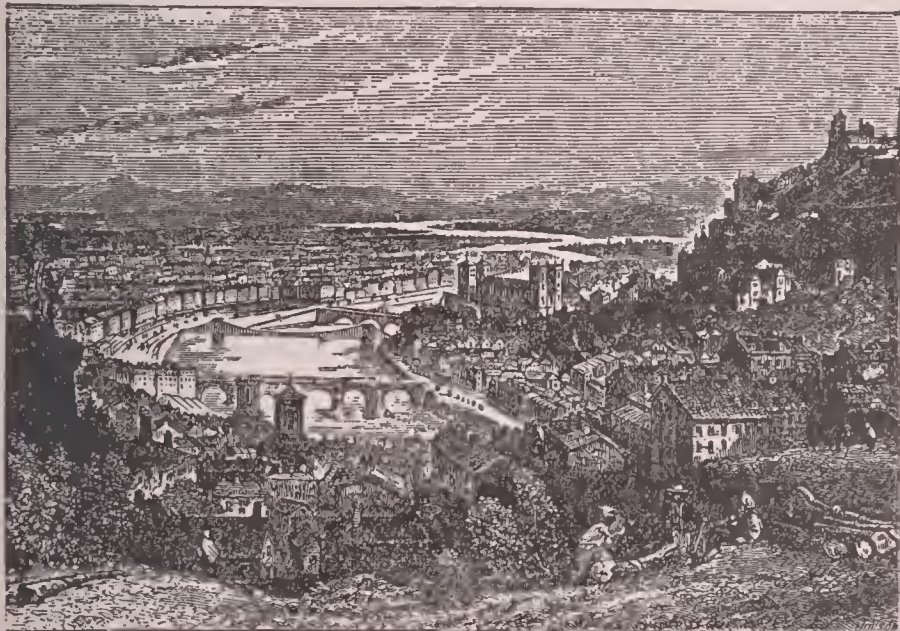
LYON, Mary, American Educator through whose influence the movement for the higher education of women was begun, was born in Buckland Mass., February, in 1797. From 1824 until 1834 she taught successively at Londonderry and Ipswich, Mass. In November, 1837, she founded Mount Holyoke Female Seminary, at South Hadley, Mass., and from that time until her death was its principal. Miss Lyon taught more than 3,000 pupils, many of whom became missionaries. In 1840 she published a pamphlet entitled *Tendencies of the Principles embraced and the Systems adopted in the Mount Holyoke*

Seminary, and also The Missionary Offering. She died in 1849.

LYON, Nathaniel, American soldier, was born in Ashford, Conn., in 1818. In the Mexican war he was present at the siege of Vera Cruz, and brevetted captain; at the assault on the Mexican capital he was wounded. At the close of that war he was ordered to California, where in 1851 he was promoted captain. Returning to the east in 1853, he sympathized with the Free State party. He was on duty in Kansas in 1859, and with Gen. William S. Harney in December, 1860, when the governor sent a brigade of militia to cooperate with the national troops in arresting James Montgomery, the Free State leader. In February he was ordered to St. Louis, Mo. There he began to drill and organize the home-guards, and had charge of the arsenal, where his ability and vigilance did much for the Union cause. The home-guards were nearly all German recruits, as the native population and the Irishmen were mostly secessionists. On June 10, 1861, at the head of a body of these

is built partly on a peninsula between the Saône and the Rhône, and partly on the opposite banks of the rivers on either side. The rivers are crossed by about a score of bridges, and the city is surrounded by a number of detached forts.

Among the chief buildings are the cathedral, mostly of the 13th century; the church of St. Martin d'Ainay, with a cupola supported by ancient Roman columns and a crypt believed to be of the 9th century; the church of St. Nizier, a fine example of flamboyant Gothic; the Hôtel de Ville, Palais de Justice, etc. In the archiepiscopal palace, situated near the cathedral, 1000 Protestants were butchered in 1572 as a sequel to St. Bartholomew. The Hôtel de Ville is considered one of the finest edifices of the kind in France. The public library has 180,000 volumes. Lyons carries on various industries, but its chief glory is that of being the greatest center of the silk manufacture in the world, giving employment in the town or surrounding neighborhood to 240,000 people. During



General view of Lyons.

German troops, he took possession of Camp Jackson, a secessionist rendezvous. A week later he was promoted to brigadier-general of volunteers, and soon afterward was placed in command of the department. He next dispersed the Confederate force at Potosi, and on June 17th defeated a body of Governor Jackson's State militia. On August 2d he defeated General McCulloch at Dry Springs, and eight days later attacked a formidable force under Generals McCulloch and Price at Wilson's Creek, when he was defeated. Here, in the ardor of action, he was twice wounded; nevertheless, keeping his saddle, he led his men to renewed attacks, until his horse was killed and himself shot in the breast by a minie rifle-ball. His death was deeply lamented throughout the Union.

LYONS, the second city in France, capital of the department of the Rhône, 240 miles s.s.e. of Paris, and 170 miles north of the Mediterranean. The town

the revolution the city suffered severely by the paralysis of its industry, and by the murderous excesses of the emissaries of the Paris convention, whom the citizens had defied, the chief buildings being destroyed and many of the inhabitants butchered. Pop. 453,155.

LYRE, one of the most ancient stringed instruments of music, consisting of a body with two horn-like pieces rising from it, and a cross piece between the horns, from which to the lower part the strings were stretched. It was used by the Egyptians, Assyrians, and Greeks. It is said to have had originally only three strings, but the number was afterward increased to seven, then to eleven, and finally to sixteen. It was played with the plectrum or lyre-stick of ivory or polished wood, also with the fingers, and was used chiefly as an accompaniment to the voice. The body of the lyre was hollow, to increase the sound. A musical instrument of similar construction is still to be met with in the hands of

the shepherds of Greece and among certain tribes of Africa.



Various forms of Egyptian, Assyrian and Greek lyres.

LYRE-BIRD, an insessorial bird of New South Wales, somewhat smaller than a pheasant. The tail of the male is remarkable for the three sorts of feathers that compose it, which by their shape and arrangement resemble the form of an ancient Greek lyre. It has a pleasing song, and is said to be capable of imitating the voices of other birds.

LYRIC POETRY, originally, poetry sung to or suited for the lyre; in modern usage, that class of poetry in which are expressed the poet's own thoughts and feelings, or the emotions attributed to another, as opposed to epic or dramatic poetry, to which action is essential.

LYSANDER, an ancient Greek general who was appointed to the command of the Spartan fleet off the coasts of Asia Minor in 407 B.C., during the Peloponnesian war. In 405 B. C. he defeated and captured the Athenian fleet off Ægospotamos, and thus put an end to the war. He was killed in a battle with the Thebans 395 B. C.

LYTLE (līt'l), William Haines, American soldier and poet, was born in Cincinnati, Ohio, in 1826. He volunteered for the Mexican War, was chosen captain of the Second Ohio Regiment, and soon after the war was elected to the state legislature. Before the civil war he had become major-general in the state militia, and in 1861 was commissioned colonel of the tenth Ohio. He was killed leading a charge of his brigade at Chickamauga, Ga., in 1863. Lytle is also well remembered as a poet through his effective Address of Antony to Cleopatra, beginning "I am dying, Egypt, dying."

LYTTON, Edward George Earle Lytton Bulwer-Lytton, Baron, was born in 1805, died 1873. He published poetry at an early age, but first gained reputation by the novels Pelham and the Disowned (1828), Devereux (1829), and Paul Clifford (1830). These were followed up with the popular romances of Eugene Aram, the Pilgrims of the Rhine, The Last Days of Pompeii, Rienzi, and Ernest Maltravers with its sequel Alice. In connection with Macready's management at Covent Garden Bulwer-Lytton produced his Duchess de la Vallière, which proved a failure, but this was retrieved by the instant success of the Lady of Lyons, Richelieu, and Money. When he had thus shown his quick adaptability of talent he returned to

novel-writing, and published in steady succession—Night and Morning, Zanoni, The Last of the Barons, Lucretia, Harold, The Caxtons, My Novel, and What will He Do with It? He entered parliament for St. Ives in 1831, and supported the reform bill as a Wig; he changed his opinions and latterly supported the conservatives. Under Lord Derby's ministry he was colonial secretary, and in 1866 entered the House of Lords as Baron Lytton. He was elected rector of Glasgow University in 1856. His later literary works were The Coming Race, published anonymously (1871), The Pari-

sians (1872), and Kenelm Chillingly (1873). Among his poetic works were the epic King Arthur; the Lost Tales of Miletus; Brutus, a drama, etc.

LYTTON, The Right Hon. Edward Robert Bulwer-Lytton, Earl of, G. C. B., son of the novelist and politician, was born in 1831; educated at Harrow and Bonn; entered the diplomatic service in 1849 as attaché at Washington, and successively served in the embassies of Florence, Paris, the Hague, Copenhagen, Athens, Madrid, Vienna, Paris, and Lisbon. He was appointed Viceroy of

India by Lord Beaconsfield in 1876, and during his administration the queen was proclaimed Empress of India, and war was waged with Afghanistan. In 1880 he resigned and was created an earl. He early attained reputation as a poet under the pen name of "Owen Meredith"; and wrote Clymnestra and other Poems, Lucile, Tannhauser, or the Battle of the Bards, Fables in Song, King Poppy, Glenaveril, besides prose works. He also published the life and letters of his father. He was appointed ambassador to Paris in 1888, and died there in 1891.

M

M is the thirteenth letter and tenth consonant of the English alphabet. It represents a labial and nasal articulation the compression of the lips being accompanied with the fall of the uvula so as to allow the voice to form a humming sound through the nose, which constitutes the difference between this letter and b.

MAARTENS (mär'těns), Maarten, a novelist of Dutch birth and English training, whose real name is J. M. M. van der Poorten-Schwartz, was born in 1858. His first novel, The Sin of Joost Avelingh, was clever and successful both with critics and the public. An Old Maid's Love, A Question of Taste, God's Fool, are other works of merit. The Greater Glory was first to gain for Maartens that general recognition that has been accorded also to My Lady Nobody and to his later novels.

MAB, a mythical personage often represented as queen of the fairies.

MACAD'AM, John Loudon, the great improver of roads, was born at Ayr, probably in 1756, and died in 1836. Having spent his early years in the United States he returned to Great Britain and was appointed agent for victualling the navy in the western ports. In 1815 he was appointed surveyor of the Bristol roads, and thus received the opportunity to put his road-making improvements into practice. He was so successful in this that the House of Commons presented him with a sum of \$10,000, and his mode of road-making is still known as Macadamization. This method consists in covering the roadway or forming the road-crust with small broken stones to a considerable depth, and consolidating them by heavy rollers, so as to form a hard, firm, and smooth surface.

MACARO'NI, Maccaroni, preparation of wheaten flour, used as food, usually simply boiled and served up with grated cheese, or in soups, etc. Macaroni is generally made in tubular pieces resembling a long pipe-stalk by pressing it through holes in a metal plate. Vermicelli is a similar preparation, but is more thread-like. Macaroni is a wholesome food, made best in the neighborhood of Naples, and considered a national dish of the Italians.—Macaroni was used as a popular term for a coxcomb or dandy about 1770-1775.

MACAR'THUR, Arthur, American soldier was born in Massachusetts in 1845. He took part in the battles of

Perryville, Stone River, and Chattanooga, and in the Atlanta campaign. In February, 1866, he entered the regular army as first lieutenant, and in July, 1889, he became assistant adjutant-general, with the rank of major. He was appointed brigadier-general of volunteers in May, 1898, and major-general of volunteers in August of the same year, and in 1898-99 was engaged on special duty in Havana, Cuba. In 1899 he was sent to the Philippine Islands, and in 1900 succeeded General Otis as commander of the Division of the Philippines and military governor of the islands. In January, 1900, he was promoted to be a brigadier-general in the regular army, and in February, 1901, to be major-general. Upon his return to the United States he was placed in command of the Department of the Lakes, whence he was transferred to the Department of California.

MACAU'LAY, Thomas Babington, Lord, historian, essayist, and politician, was born 1800 at Rothley Temple, Leicestershire, and died at Kensington 1859. In 1818 he entered Trinity College, Cambridge, where he obtained the Chancellor's medal for a poem on Pompeii, and a second time for a poem on Evening; received a fellowship, and took his M. A. degree in 1825. Before this he began to contribute to Knight's Quarterly Magazine, in which appeared his poems of the Armada, Ivry, and the Battle of the League; and in 1825 he inaugurated

ber for Calne, and made his first speech in support of freedom for the Jews in England. During his political career Macaulay had continued his literary labors. In 1842 he published his Lays of Ancient Rome; and in 1848 appeared the first two of the five volumes of his History of England, which covers the period between the accession of James II. and the death of William III. This brilliant rhetorical exposition, although touched with partisanship and with a tendency to paradox, has attained the position of an English classic. He was created a peer in 1857, and at his death he was buried in Westminster Abbey. The Life and Letters of Macaulay has been published by his nephew, Sir Geo. Otto Trevelyan.

MACAW', a genus of beautiful birds of the parrot tribe. The macaws are magnificent birds, distinguished by



Red and blue macaw.

having their cheeks destitute of feathers, and their tail-feathers long. They are all natives of the tropical regions of South America. The largest and most splendid in regard to color is the great scarlet or red and blue macaw. The great green macaw and the blue-and-yellow macaw are somewhat smaller.

MACAW-TREE, the name given to several species of trees of the genus Acrocomia, natives of tropical America, the fruit of one species yields an oil of a yellowish color of the consistence of butter, with a sweetish taste and an odor of violets, used by the natives of the West Indies as an emollient in painful affections of the joints.

MACBETH', MACBEDA, or MACBETHAD, son of Finnelaech, a king of Scotland who reigned from 1040 to 1057. During the reign of Duncan he was



Lord Macaulay.

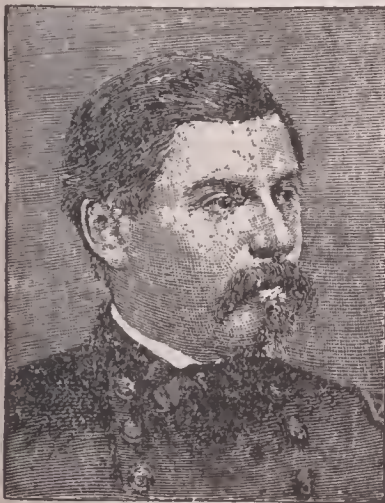
his brilliant career in the Edinburgh Review by his article on Milton. He was called to the bar at Lincoln's Inn in 1826. He entered parliament in 1830 as mem-

"mormaer" of Moray by inheritance, and by his marriage with Gruoch, granddaughter of Kenneth IV. This Duncan, in his attempt to subdue the independent chiefs of the north, was slain by Macbeth at "Bothgowan," which is supposed to be near Elgin. By this means Macbeth became king, and, according to all accounts, his reign was fairly successful. In 1050 he is said to have gone on a pilgrimage to Rome. At the death of their father the sons of Duncan had taken refuge with their uncle Siward, earl of Northumberland, and with his aid they invaded Scotland in 1054; a battle was fought at Dunsinane, but it was not until 1057 that Macbeth was finally defeated and slain at Lumphanan in Aberdeen. The legends which gradually gathered round the name of Macbeth were collected by John of Fordun and Hector Boece, and reproduced by Holinshed in his Chronicle, and there found, as is supposed, by Shakespeare, who has made such splendid use of them.

MACCABEES, Books of, treat of the Jewish history under the Maccabean princes; they are five in number, the first two of which are included in the English Apocrypha, and are accounted canonical by the Roman and Greek churches.

M'CARTHY, Justin, M. P., novelist, historian, and politician, was born at Cork in 1830. His novels are numerous, and his historical writings include *A History of Our Own Times*, *History of the Four Georges*, etc. He was a Home Rule representative for Longford from 1879 till 1900. He died in 1904. His son, Justin Huntley McCarthy (born 1859), has also been an M. P. of the same party, and is favorably known in literature as the author of *If I Were King*.

MACCLELLAN, George Brinton, an American general, born at Philadelphia 1826, died 1885. He was trained at the West Point Military School; served in the Mexican war; joined the Red river expedition as engineer; and in 1855 was



George B. MacClellan.

appointed to the commission which reported on the condition of European armies, and watched the military operations during the Crimean war. At the outbreak of the civil war in the states he superseded McDowell after the first battle of Bull's Run; and became com-

mander-in-chief on the 1st November, 1861. In this capacity he organized the raw levies of the North and advanced against Richmond the following spring, but was relieved from his supreme command by President Lincoln in 1862, and thenceforth led the army of the Potomac in a series of engagements which terminated in the Seven Days' Battle, when he had to retire from his lines in front of Richmond. Afterward, when Lee advanced into Maryland, MacClellan fought the battles of South Mountain and Antietam (September 14-17, 1862), and compelled the confederate forces to retire. The political authorities being dissatisfied with his apparent slackness in following up this victory, MacClellan was relieved from his command and retired from the army. In 1864 he was nominated for the presidency, but was overwhelmingly defeated by Abraham Lincoln.

M'CLERNAND, John Alexander, American soldier, was born in Kentucky in 1812. He removed to Illinois, and practiced law, and for some years edited a newspaper at Shawneetown. In 1836-40 and in 1842 he served in the state legislature, and from 1843 to 1851 sat in congress as a democrat. In 1859 he was reelected to congress, but resigned at the beginning of the civil war to raise a brigade of which he was given command. He commanded the right of the line at Fort Donelson, led a division at Shiloh, and was at Champion Hill, Vicksburg, and other battles. Afterward he commanded the thirteenth army corps until relieved in July, 1863, and in November, 1864, he resigned from the army. He died in 1900.

MACCLINTOCK, Vice-Admiral Sir Francis Leopold, K. C. B., born at Dundalk 1819; entered the navy in 1831; became a lieutenant in 1845; and in 1848 joined the expedition sent out by the British government in search of Sir John Franklin, the Arctic explorer. In 1850, and again in 1852, he went out with other Arctic expeditions, and on the latter occasion was instrumental in rescuing MacClure and his companions. MacClintock set forth again in 1857 as commander of the *Fox*, a vessel equipped by Lady Franklin, and discovered documentary and other evidence of the death of Franklin. For these services the explorer was knighted in 1860. He died in 1887.

MACCLURE, Vice-Admiral Sir Robert John Le Mesurier, C. B., born in 1807, died in 1873. He entered the navy in 1824; joined an Arctic expedition in 1836; accompanied Sir John Ross into the same region in 1848; and himself took command of an Arctic expedition in 1850. He penetrated as far north as Melville Sound, and there discovered a passage from the Atlantic to the Pacific, which he named Prince of Wales Strait.

M'CLURE (ma-kloor'), Alexander Kelly, American journalist, was born in Sherman Valley, Perry co., Pa., in 1828. He was state superintendent of printing in 1855, a member of the state convention of 1855, which met at Pittsburg to organize the republican party. As a leader of the Pennsylvania delegation in the republican national convention of 1860 he aided in the nomination of

Abraham Lincoln. In 1875 he established the *Philadelphia Times* of which he was editor in chief till 1891. He has published *Three Thousand Miles Through the Rocky Mountains*, *Our Presidents and How We Make Them*. *Recollections of Half a Century*.

M'CLURE, Samuel Sidney, American editor and publisher, was born in County Antrim, Ireland, in 1857. In 1884 he established a newspaper syndicate which has grown to great proportions. In 1893 he founded *McClure's Magazine* and in 1899 the publishing house of McClure, Phillips & Company, New York. He is the president also of the S. S. McClure Company of the same city.

M'COOK, Alexander McD., American soldier, was born in Ohio in 1831. He served against the Apaches, and from 1858 to 1861 was instructor of infantry tactics at West Point. He commanded a regiment at the first battle of Bull Run, and a division of the army of the Ohio in the Tennessee and Mississippi campaigns. He was brevetted colonel for services at Shiloh, and finally brigadier-general and major-general United States army for gallant and meritorious services at Perrysville and elsewhere. At the close of the war he was brevetted brigadier-general in the regular army for "gallant and meritorious services at the battle of Perryville" and major-general for "gallant and meritorious services in the field during the rebellion," and in March, 1867, reentered the regular service as lieutenant-colonel. He became a brigadier-general in 1890 and a major-general in 1894, was retired from service in 1895, represented the United States at the coronation of the Czar in May, 1896, and from September, 1898, to February, 1899, served on a commission appointed by President McKinley to investigate the administration of the war department during the Spanish-American war. He died in 1903.

M'CORMICK, Cyrus Hall, American inventor and manufacturer, was born in Virginia in 1809. He moved to Chicago in 1847. In 1831 he constructed the reaping machine which has become known all over the world. In 1859 he contributed largely to the establishment at Chicago of the Presbyterian Theological Seminary of the Northwest, and afterward endowed a professor's chair in Washington and Lee University, Lexington, Va. He died in 1884.

M'COSH, James, a Scottish-American philosopher, was born in Ayrshire, Scotland, in 1811. In 1868 he came to America and became president of Princeton College of New Jersey, and took a prominent place among American divines and educators. He resigned the presidency in 1888 owing to advancing age but retained the chair of philosophy and continued to live in Princeton until his death. Besides numerous contributions to British and American reviews, he has published many philosophical works and essays, and some occasional sermons and addresses. He died in 1894.

M'CULLOCH, Ben, American soldier, was born in Rutherford co., Tenn., in 1811; In 1835 he started to join the party of David Crockett and other Texan revolutionists at Nacogdoches.

In the war between the United States and Mexico he won distinction as an officer of the Texas rangers. He was particularly successful as a scout and was made quarter-master with the rank of major. In 1849 Major McCulloch settled at Sacramento, Cal., where he was chosen sheriff of the county. In 1852 he returned to Texas, where he was appointed United States marshal under the democratic administration, and later spent several years in Washington. At the outbreak of the war between the states he resigned his government employment and joined the confederates, and was commissioned brigadier-general on May 14, 1861. He gathered a force of men, and marched through Arkansas toward Missouri, formed a junction with the troops under Gen. Sterling Price and encountered the national troops under Gens. Nathaniel Lyon and Franz Sigel. The battle of Wilson's Creek was the result, where the confederates were victorious. Later he led a division at the battle of Pea Ridge and, while riding forward to reconnoiter, was killed by a bullet.

M'CULLOCH, Hugh, American financier, was born in Maine in 1808. In 1863 he became comptroller of the currency and assisted Secretary Chase in carrying out the provisions of the act organizing national banks. In March, 1865, he became secretary of the treasury, which office he held for four years. He was instrumental in converting the debt and took strong ground in favor of a resumption of specie payments and the reduction of the national debt. From 1871 until 1878 he was at the head of a banking institution in England, and in October, 1884, he succeeded Judge Gresham as secretary of the treasury. He resigned in March following. He died in 1895.

M'CLOSKEY, John, cardinal, was born in Brooklyn, N. Y., in 1810. In 1834 he was ordained to the Roman Catholic priesthood. In 1837 he became pastor of St. Joseph's Church in New York City, and in June, 1841, when Bishop Hughes opened St. John's College in Fordham, N. Y., he was appointed its president. In 1844 he was translated to the new Roman Catholic diocese of Albany, N. Y., where he continued seventeen years, and built the cathedral. In May, 1864, he succeeded Dr. John Hughes as archbishop of New York. Here he built the new St. Patrick's cathedral, and in 1875 was created cardinal-priest, being the first American elevated to that dignity. On several occasions he was called on to confer with the propaganda at the vatican; and he took part in the election of Leo XIII. He died in 1885.

MACDONALD, George, LL.D., novelist and poet, was born at Huntly in 1824. Among his numerous novels are *David Elginbrod*, *Alec Forbes*, *Annals of a Quiet Neighborhood*, *Robert Falconer*, *Malcolm*, *The Marquis of Lossie*, *Castle Warlock*, etc. He died in 1905.

MACDONALD, Sir John Alexander, K.C.B., D.C.L., Canadian statesman, was born in Scotland in 1815. Being taken to Canada, he was educated at Kingston; admitted to the bar in 1835; entered parliament for Kingston in 1844;

and became successively a member of the executive council, receiver-general, commissioner of crown lands, and attorney-general. He became premier in 1867, a position which he held until 1873 when he resigned over the Pacific Railway charges, but resumed the office again in 1878, and held it till his death in 1891. He was an active promoter of the Canadian Pacific Railway and Canadian confederation, and was leader of the conservatives.

MACDUFF. See Banff.

MACE, a weapon of war in use in Europe as late as the 16th century. It consisted of a staff about 5 feet long, with a heavy metal head, which assumed a variety of forms, but was frequently in the form of a spiked ball. Another kind of mace is a sort of heavy ornamental staff used as an emblem of authority in universities, courts of law, parliament, etc.

MACE, a spice, the dried aril or covering of the seed of the nutmeg, this covering being a fleshy net-like envelope somewhat resembling the husk of a filbert. When fresh it is of a beautiful crimson hue. It is extremely fragrant and aromatic, and is chiefly used in cooking or in pickles.

M'CULLOUGH (m'-kūl'lo), John Edward, American tragedian, was born at Blakes, Londonderry, Ireland, in 1837. He came to the United States in 1853, and first appeared on the stage in a minor part at the Arch Street Theater, Philadelphia, in 1857. In 1866-68 he traveled with Edwin Forrest, whose methods he imitated. He took many notable rôles, including *Laertes*, *Iago*, *Edgar*, *Macduff*, *Richmond*, *Hamlet*, *Richelieu*, *Falconbridge*, *Pierre*, *De Mauprat*, *Richmond*, *Spartacus*. His chief part, however, was *Virginius*, in which, indeed, he was unrivaled during his time. His interpretations were of the heroic type. He died in 1885.

MACDONOUGH (măk-dŏn'o), Thomas, American naval officer, was born at Macdonough, Del., in 1783. He entered the United States navy as a midshipman in 1800; served on the *Constellation* under Commodore Murray, in 1801-02; and in 1803 started for Tripoli in the *Philadelphia*, Commodore Bainbridge, but at Gibraltar was placed in charge of a captured Moorish frigate, and thus escaped capture and imprisonment at the hands of the Tripolitans when the *Philadelphia* ran aground on November 1, 1803. In the war of 1812 he served as first lieutenant on the *Constitution*, and in September, 1812, was placed in command of the United States naval force on Lake Champlain. In the following year he was promoted to be master commander, and in Plattsburg harbor, on Sunday, September 11, 1814, with a fleet of 14 vessels, carrying 86 guns and about 800 men, he completely defeated a British fleet of 16 vessels, carrying 95 guns and about 1000 men under Capt. George Downie. For this victory he was commissioned captain, then the highest rank in the United States navy, and received a gold medal from congress and an estate on Cumberland Head, near Plattsburg, from the legislature of Vermont. He died in 1825.

MACEDO'NIA, in ancient geography, a territory lying to the north of Greece, which first became powerful under its king Philip, the father of Alexander the Great, and conqueror of Greece. Alexander the Great added immensely to the empire of Macedonia, and made, what had only been a petty province, mistress of half the world. After his death the empire was divided; dominion was lost over Greece; and the result of the battles of Cynoscephalæ (197 B.C.) and Pydna (168 B.C.) was to reduce the ancient kingdom to a Roman province. Macedonia now forms a part of Turkey in Europe, and is inhabited by Wallachians, Turks, Greeks, and Albanians.

MACERATA (mă-che-ră'tă), a town in Italy. Pop. 20,263.—The province, bounded north by Ancona, west by Umbria, south by Ascoli, and east by the Adriatic, has an area of 1056 sq. miles, produces much corn, fruit, and hemp, and rears great numbers of sheep and cattle. Pop. 250,368.

MACFARREN, Sir George Alexander, musical composer, born in London 1813, died 1887. His chief operas are *The Devil's Opera*, *Don Quixote*, *Robin Hood*. He also essayed the cantata in Lenore, and the *Lady of the Lake*, while his oratorios are *St. John the Baptist*, *The Resurrection*, *Joseph*, and *King David*. He also wrote several musical treatises.

MACGAHAN (măk-gă'han), J. A., American journalist and traveler, was born in Perry co., Ohio, in 1844; died in Turkey, June, 1878. In 1870, while visiting in Europe, he was engaged as special correspondent for the *New York Herald*. Afterward he became special correspondent for the *Herald* at St. Petersburg, and reported the proceedings of the Geneva conference. In January, 1873, he started on his famous expedition to Khiva. In 1874 he published in London his *Campaign on the Oxus*, and the *Fall of Khiva*. In the same year he joined the Carlist forces in Spain and for ten months contributed letters to his paper from that country. During the Russo-Turkish war, which followed, he met with a severe accident, but managed to keep in the field, and described the scenes of battle from the fight at Shipka Pass to the surrender of Plevna. He died at Pera, in 1878, a suburb of Constantinople, of an epidemic disease.

M'DOWELL, Irvin, American soldier was born at Columbus, Ohio, in 1818. On the breaking out of the civil war he was made a brigadier-general and appointed to the command of the federal troops at Washington. He was in command when the Union army was defeated at the battle of Bull Run, July 21, 1861. General McClellan took the command soon after that battle, and General McDowell was placed in charge of the troops around Washington. He was made a major-general of volunteers, March 14th, and commander of the department of the Rappahannock, April 14, 1862. In 1863-64 he was president of the court for investigating cotton frauds, and of the board for retiring disabled officers. In November, 1872, he was made major-general of the regular army, and successively had com-

mand of the various military departments into which the United States is divided, until he was placed on the retired list in 1882. He died in San Francisco May 4, 1885.

M'GEE, W. J., American geologist, anthropologist, and ethnologist, was born near Dubuque, Iowa, in 1853. He began the study of archæology and geology in 1875, and in 1877-81 executed a topographic and geological survey of 17,000 square miles in northeastern Iowa. In 1881 he was appointed geologist in the United States Geological Survey, and in 1885 and 1892 compiled standard geological maps. In 1893, having resigned from the Geological Survey, he was appointed ethnologist-in-charge in the Bureau of American Ethnology. In 1895 he explored the Isla del Tiburon, Gulf of California, home of the Seri Indians, a savage tribe which until then had not been studied. His publications include: *The Pleistocene History of Northeastern Iowa*, *The Geology of Chesapeake Bay*, *The Siouan Indians*, *Primitive Trephining*, *The Seri Indians*, *Primitive Numbers*, and many other memoirs and minor papers.

M'GLYNN, Edward, American Roman Catholic clergyman, was born in New York City, in 1837. He was educated at the public schools of New York City, and for ten years, from 1851 to 1860, studied theology at the college of the Propaganda in Rome. In 1860 he was ordained priest of the Roman Catholic church, and on his return to the United States became a hospital chaplain. In 1866 he became pastor of St. Stephen's church in New York City. His unwillingness to establish a parochial school in connection with his church brought him into disfavor with the archbishop of his diocese and his coadjutor, Mgr. Preston. He also spoke in favor of the land theories of Henry George on several public occasions, for which he came under the censure of his church, and was suspended. In December, 1892, after a hearing before the Apostolic Delegate, Mgr. Satolli, he made his submission and was restored to his priestly functions. He died in 1900.

M'KINLEY, William, 25th president of the United States, was born in Niles,



William McKinley.

Ohio, in 1843. After teaching school for a short period, he enlisted, in June,

1861, in the twenty-third Ohio infantry, under command of Colonel (subsequently General) W. S. Rosecrans, and served through the war, gaining the rank of brevet major. He returned to Poland at the close of the war, began the study of law, and was admitted to the bar in 1867. Entering on the practice of law at Canton, Ohio, he soon mingled in politics, and became a leading stump speaker in the state. He was elected prosecuting attorney in 1869, and in 1876 member of congress, and re-elected successively until 1882. With one exception he continued to hold his seat in congress until 1890. He was elected governor of Ohio in 1891, and re-elected in 1893 by a majority of 80,000. In June, 1896, he was nominated by the republican national convention at St. Louis for president, and elected by a vote of 271 in the electoral college to 176 for William J. Bryan, his democratic opponent. In 1900 he was re-elected by increased majorities both in the popular vote and in the electoral college, the latter giving him 292 votes to 155 for W. J. Bryan. While holding a public reception at the Pan-American Exposition at Buffalo, Sept. 6, 1901, he was shot through the stomach by an anarchist named Leon Czolgosz, of Cleveland, O. An operation was performed immediately, and the President was removed to the home of President Milburn of the Exposition. For a week the physicians announced steady improvement, and it seemed that he was well out of danger, when he relapsed, and died at 2:15 A. M., Sept. 14. Gangrene had set in, and a post-mortem examination showed that from the first there was no hope of recovery. He was buried at Canton, O., Sept. 19.

MACGILL (-gil'), James, born in Glasgow, Scotland, 1744, died at Montreal 1813. He emigrated to Canada, and ultimately became one of the chief merchants in the city. He left property valued at \$150,000 (now enormously increased in value), and \$50,000 cash to found the university in Montreal which bears his name.

MACHIAVELLI (mák-yá-vel'le), Niccolò, a distinguished Italian statesman and historian, born at Florence in 1469; died in 1527. He became prominent in public affairs in 1498, when he was appointed secretary to the Ten at Florence. For more than fourteen years he guided the destinies of the Florentine Republic, undertook embassies, concluded treaties, and jealously conserved the rights and liberties of his native city. When the Medici returned to power in 1512 by aid of Pope Julius II., Machiavelli was deprived of his office, and imprisoned for his supposed complicity in a plot to overturn the new authority, but being released after a time he retired to his country house of San Casciano. The name of Machiavelli was for long synonymous with all that is tortuous and treacherous in state affairs. The more recent, as also the more generous estimate of this Italian statesman, is to regard his Prince as a first honest but imperfect attempt to construct a state out of the decayed mediæval institutions still lingering in Italy, and that its defects on the ethical side are due to the corrupt times in

which he lived, the conditions of political dissimulation under which his experience was gained, and the overmastering desire he had to see his country unified and made great.

MACHINE GUN, a name given to any of those pieces of ordnance that are loaded and fired mechanically, and can deliver a number of projectiles simultaneously or in rapid succession, having usually a number of separate barrels. The first of these to come into prominence in warfare was the French mitrailleuse, or mitrailleuse, which was employed in the Franco-German war. The Gatling gun first appeared in the United States, and was speedily adopted by Britain and other powers, with modifications. Other guns of this kind are the Hotchkiss, the Nordenfeldt, and the Gardner gun. Such guns, while having their own use in warfare by land, are regarded as being of special value in marine warfare, and are intended mainly for use against torpedo-boats. The Nordenfeldt, the Gatling, and the Gardner are all in use in the British navy. The Gardner gun may be mounted in various ways—on a gun-carriage, or on a tripod stand, the legs of which can be screwed down to a ship's deck. As to absolute rapidity of fire the Nordenfeldt has slightly the superiority; yet the two-barrel Gardner can fire 236 rounds, the five-barrel Gardner 330 rounds in half a minute, while as regards reliability for continuous work and ease and rapidity of fire the Gardner gun has manifested a marked superiority over the Nordenfeldt. The latter is fired by a handle with a reciprocating motion, while the Gardner is fired by a handle with a rotary motion, which is the same whatever the elevation or depression of the gun. The Hotchkiss gun fires heavier projectiles (hollow percussion shells) than the other machine guns, the fire being continuous. It may be described as consisting of a gun-metal frame in which five Whitworth steel barrels revolve with intermittent motion, having a single firing action and cast-iron breech. The barrels become stationary at the moment of firing, loading, and extracting the empty cartridges. A more recent machine gun is the Maxim, which, after the first shot is fired by hand power, continues to fire shot after shot by means of the power derived from the explosion of each successive cartridge.

MACHINE TOOLS, a name given to various machines constructed to perform operations that otherwise would be done by hand. They include planing machines, drilling machines, punching machines, boring machines, steam hammers, etc.; and some of them are marvels of accuracy and ingenuity.

MACKAY (ma-kē'), Charles, LL.D., poet and miscellaneous writer, born at Perth in 1812. He visited America on a lecturing tour (1858), and represented the Times in New York during the civil war. His chief prose and poetical works are: *Songs and Poems* (1834), *The Hope of the World and other Poems* (1840), *Voices from the Mountains* (1847), *Forty Years' Recollections, 1830-1870* (1876), *Poetry and Humor of the Scottish Language* (1882), *The Founders of the American Republic* (1885), a work

on Celtic Etymology, and many other works. He died in 1889.

MACKAY, John William, American capitalist, born in Dublin, Ireland, in 1831. He came to New York City when he was a boy. In 1851 he went to California and in 1852 to Nevada, where he secured a two-fifths share in the Bananza mines of the Comstock Lode. With Flood, Fair, and O'Brien, his partners, he formed the Nevada Bank, and was long its president, but withdrew his capital after Flood's disastrous attempt to corner wheat. In 1884, largely because of enmity to Jay Gould, he formed with James Gordon Bennett the Commercial Cable Company and the Postal Telegraph Company to fight the Western Union; laid the cable in spite of many difficulties, and fought a long fight with the old cable lines, which cut the rate to 12 cents a word in a vain attempt to force Mackay out. He died in 1902.

MACKENZIE, Sir Alexander, Canadian explorer, born at Inverness, Scotland, 1755; died 1820. In the employment of the Northwest Fur Company he explored the great river named after him from the western end of Great Slave Lake to the Arctic Ocean (1789). He made another expedition to the western coast (1792), and was the first white man to cross the Rocky Mountains and reach the Pacific coast. He returned to Britain in 1801, and was knighted.

MACKENZIE, Alexander, Canadian statesman, born in Logierait, Perthshire, Scotland, 1822. Originally a stonemason, he emigrated to Kingston, Canada, in 1842, and began business as a builder and contractor. In 1852 he was editor of a liberal newspaper, and he entered parliament in 1861, becoming leader of the liberal party in 1873. On the resignation of Sir John Macdonald that same year he became premier, and retained office with much success till 1878. He died in 1892. He more than once declined the honor of knighthood.

MACKENZIE, Sir Alex. Campbell, composer, born at Edinburgh 1847. He became principal of the Royal Academy of Music in 1888. He is the author of the oratorio *The Rose of Sharon* (1884), the operas *Colomba* (1884), and *The Troubadour* (1886), the cantata of the *Story of Sayid* (1886), *The Dream of Jubal* (1889), etc.

MACKENZIE, Sir Morell, M.D., born at Leytonstone, Essex, 1837; educated at London Medical College, Paris, and Vienna; obtained the Jackson prize for diseases of the larynx; became physician to the London Hospital, and lecturer on diseases of the throat. In 1887-88 he was associated with the specialists of Berlin and Vienna in the treatment of the larynx disease of the Emperor Frederick (at first, while he was Crown Prince) of Germany. He is the author of a treatise on *Diseases of the Throat and Nose* and several other works. He died in 1892.

MACKENZIE, a district of the Northwest Territories, Canada, created in 1895. It extends from Athabasca and British Columbia on the south to the Arctic waters on the north, and from Keewatin on the east to Yukon on the west, the western boundary line follow-

ing the line of the Rocky Mountain Divide. It contains an area of 563,200 sq. miles, being the largest district of Canada, and almost as large as the territory of Alaska. It is hummocky and broken throughout, with numerous swamps and lakes. Great Bear Lake in the north and Great Slave Lake in the south are two of the largest lakes in the dominion. The western half of the district is drained by the Mackenzie river. Among other streams are the Copper-mine and the Great Fish, or Back rivers. The winters are long and severe, the summers short and warm.

MACKENZIE RIVER, a large river in the Northwest Territories of Canada, which flows out of Great Slave Lake, first west, then north, finally northwest; and after a course of about 1200 miles falls into the Arctic Ocean by numerous mouths. It was discovered by Alexander Mackenzie in 1789.

MACKEREL, one of the spiny finned fishes, a well-known and excellent table fish, which inhabits almost the whole of the European seas. Mackerel, like



Mackerel.

herring, are caught only when they approach the shore to spawn, nets being chiefly used. The North American mackerel is also caught in great quantities on the Atlantic coasts.

MACLURE, William, the pioneer of American geology, was born at Ayr in Scotland, in 1763. In 1796 he came to this country. In 1803 he visited France as one of the commissioners appointed to settle the claims of American citizens on the French government for spoliations committed during the revolution; and during the few years then spent in Europe he applied himself with enthusiasm to the study of geology. On his return home he commenced the task of making a geological survey of the United States. Almost every state in the Union from St. Lawrence to the Gulf of Mexico was traversed and mapped by him, the Alleghany mountains being crossed and recrossed some fifty times. The results of his unaided labors were submitted in a memoir to the American Philosophical Society (1809), and published in the *Society's Transactions* (vol. vi.), together with a geological map, which thus antedates William Smith's great geological map of England by six years. From 1817 to his death MacLure was president of the Academy of Natural Sciences of Philadelphia, and much of the prosperity of the institution was due to his devoted services. He died in 1840.

M'KEESPORT, a city in Allegheny co., Pa., on the Monongahela river at the mouth of the Youghiogheny river, both of which are here navigable for steamboats, and on the Balto. and O., the Penn., and the Pitts. and Lake Erie railways; 14 miles s.e. of Pittsburg. It is the center of the greatest bituminous coal region in the country and of the

natural-gas wells, and is a large manufacturing center. Pop. 42,175.

M'ALASTER, John Bach, American historian, was born in Brooklyn, N. Y., in 1852. In 1883 he was elected professor of American history at the University of Pennsylvania and in the same year the first volume of a *History of the People of the United States* was published. It is designed to cover the period from 1783 to 1861. Among his other published works are *Benjamin Franklin as a Man*, *Origin, Meaning and Application of the Monroe Doctrine*, *A School History of the United States*, and *Daniel Webster*.

MACMONNIES (măk-mŭn'iz), American sculptor, was born in Brooklyn in 1863. The most important of his works and the one which has done most to secure his reputation was the colossal fountain in the court of honor at the Columbian Exhibition in Chicago in 1893. He also executed the Army and Navy groups for the *Soldiers' and Sailors' monument* at Indianapolis, the decorations of the triumphal arch at the main entrance to Prospect Park, Brooklyn, and the *Battle Monument* at West Point. He was made chevalier of the Legion of Honor in 1898 and won a grand prize of honor at the Paris exposition of 1900.

M'PHERSON, James Birdseye, American soldier, was born in Sandusky, Ohio, in 1828. At the beginning of the civil war he applied for active duty, was appointed lieutenant-colonel, November 12, 1861, and became major-general of volunteers October 8, 1862. In the early part of 1862 he was attached to the staff of Gen. U. S. Grant, and served as chief engineer at Fort Henry, Fort Donelson, Shiloh and the siege of Corinth. At the battle of Fort Gibson part of his corps, led by himself, decided the battle in favor of the federals. On May 12th his corps engaged part of Gen. Joseph E. Johnson's army at Raymond, and routed it. On August 1, 1863, he was made brigadier-general in the regular army. In 1864 General McPherson was advanced to the command of the army of the Tennessee. He assembled 25,000 men at Huntsville, Ala., in April, 1864. From May until June he had constant skirmishes with the confederate forces, and led several attacks that inflicted losses, but led to no permanent results. On July 22nd General Hood massed the confederate forces and made an attack on the left flank of General Sherman's army, commanded by General McPherson. The latter at the time was at General Sherman's headquarters, engaged in consultation, and rode rapidly to the threatened point. In attempting to pass from one column to another, to meet this attack, he unguardedly passed into the enemy's lines, and was killed. As a general he showed remarkable ability, being self-possessed, quick of perception and of untiring activity. In one of the public parks of Washington a statue is erected to his memory by his comrades of the army of the Tennessee.

MACMAHON (mak-mă-ŏn), Marie Edmé Patrick Maurice de, Duke of Magenta and Marshal of France, born

In 1808; educated at the military college of St. Cyr; served with distinction in Algeria; became brigadier-general in 1848; received command of a division during the Crimean war, and assisted in storming the Malakoff; took part in the campaign of 1859 against Austria, and won the battle of Magenta by his prompt handling of the left wing; and after the war became governor-general of Algeria. At the outbreak of war between France and Germany (1870) Macmahon was placed in command of the 1st army corps, which was defeated at Weissenburg, Wörth, and finally fell back upon Châlons. Here he rallied his forces, and proceeded northeastward to relieve Bazaine, who was besieged in Metz, but he was pursued by the Germans, shut up by their encircling armies in the town of Sedan, and wounded in the battle before the final surrender. After the armistice with Germany he was employed by the Versailles government in putting down the commune, and in 1873 he was elected president of the republic, a position which he occupied until 1879. He died in 1893.

MACON, a city in Georgia, on the Ocmulgee, the seat of a Baptist university and a Wesleyan female college. Pop. 26,172.

MACREADY (mak-rē'di), William Charles, English tragedian, born in London 1793, died at Cheltenham 1873. He played in the provinces with considerable success, and appeared at Covent Garden in 1816. In 1826 he made his first visit to America, and in 1828 played in Paris, with great success in both countries. He undertook the management of Covent Garden in 1837, and Drury Lane in 1842. He revisited the United States in 1849; returned to England; gave a series of farewell performances, and finally retired from the stage in 1851. His *Reminiscences* appeared in 1875.

MCVEAGH, Wayne, American lawyer and cabinet officer, was born at Chester co., Penn., in 1833. In 1870 he was appointed United States minister to Turkey, and in 1877 he was a member of the commission which visited Louisiana by request of President Hayes. At the accession of Mr. Garfield, in March, 1881, Mr. McVeagh was appointed attorney-general of the United States. This position he resigned on the accession of President Arthur. He supported Cleveland for the presidency in 1892 and from 1893 to 1897 was ambassador to Italy.

MADAGASCAR, a large island in the Indian Ocean, 230 miles distant from the east coast of Africa, from which it is separated by Mozambique Channel; length, 975 miles; average breadth, 250 miles; area, about 228,500 sq. miles; population, about 2,500,000. Madagascar may be described as an elevated region, with an average height of 3000 to 5000 feet, overlooked by mountains rising in some cases to nearly 9000 feet. The most striking feature in the vegetation is a belt of dense forest, with an average breadth of 15 to 20 miles, passing round the whole island. It is found at all levels from 6000 feet to the water's edge, and the trees include

palms, ebony, mahogany, fig, cocoanut, and the ravinala or traveler's tree, which when pierced yields a refreshing juice. The vegetable products grown for food include rice, manioc or cassava, sweet-potatoes, ground-nuts, and yams. Ginger, pepper, and indigo grow wild in the woods; cotton, sugar-cane, coffee, tobacco, and hemp are cultivated. India-rubber, gum-copal, and dye-woods are exported. Humped cattle are found in immense herds, and form a large part of the wealth of the inhabitants, as also sheep, goats, swine, and horses. The most characteristic of the mammals are the lemurs. The birds are numerous; snakes are rare; crocodiles, lizards, chameleons abound. The native government, till overthrown by the French, was an absolute monarchy. The army consisted of 20,000 men, raised to 50,000 in the war with France. The capital is Antananarivo, in the elevated central region, with a population estimated at 100,000.—Madagascar was known to Marco Polo at the end of the 13th century, and in 1506 was visited by the Portuguese, who gave it the name of St. Lorenzo. Toward the end of the 17th and during the most of the 18th century the French established themselves in the island, but they were only able after a hard struggle to retain the islands of Ste. Marie on the east coast and Nossi-bé on the northwest. In the year 1810 Radama I. became king of the Hovas, and with his approval Christian missionaries began to teach in the capital in 1820, many converts were made, the Bible was translated into the Malagasy tongue, the language was first reduced to a systematic written form, and printing was introduced. In 1828 he was succeeded by his chief wife, Ranavalona, a woman of cruel disposition, who persecuted the Christians and closed the island to Europeans. She was succeeded in 1861 by her son, Radama II., who reopened it to the missionaries and emancipated the African slaves. He also granted extensive territories and privileges to France, an act which offended his chiefs and led to his assassination in 1863. His wife occupied the throne five years, and on Ranavalona II. becoming queen in 1868, the French brought forward their claims on the Malagasy territory, which being refused, led to war. The result was a treaty (1885) by which Madagascar became a French protectorate. Since then, by means of a military expedition, the French have reduced the island to the position of a colony (1895).

MADDER, a dye plant. It is a climbing perennial, with whorls of dark green leaves, and small yellowish cross-shaped flowers. The prepared root is used as a red dye-stuff. It yields colors of the greatest permanence, and is employed for dyeing both linen and cotton. Two kinds of it are fixed upon cotton; one is simply called madder-red, and the other, which possesses a much higher degree of luster and fixity, is called Turkey or Adrianople red, because it was for a long time obtained entirely from the Levant, where it was called alizar. The coloring principle of madder is termed alizarine, and as this can now be obtained artificially from coal-tar,

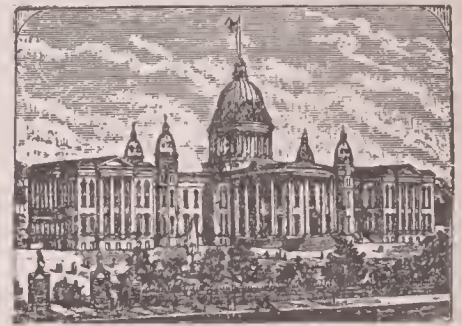
the use of madder in dyeing is almost entirely superseded by that of artificial alizarine.



Madder plant.

MADEIRA (mā-dā'i-rā), a Portuguese island in the North Atlantic, 360 miles from the coast of Africa, 530 miles from Lisbon, 1215 from Plymouth; length, 30 miles; breadth, 13 miles; area, about 313 sq. miles. The staple products of Madeira are wine and sugar. The mean annual temperature is 65°, the two hottest months being August and September, and the three coldest January, February, and March. The climate is equable and the island is considered an excellent sanatorium for chest diseases. The Madeiras were known to the Romans, and were rediscovered and colonized by the Portuguese in 1431. Pop. 148,172.

MADISON, the capital of Wisconsin, 75 miles west of Milwaukee, situated upon an isthmus between lakes Mendota and Monona, and founded 1836. It con-



State capitol, Madison, Wis.

tains the state-house, the state university dating from 1851, and has a lunatic asylum, etc. It is a great railway center, has important manufactures, a large trade, and a population of 21,000.

MADISON, a city in Indiana, on the right bank of the Ohio, 80 miles s.s.e. Indianapolis. Pop. 11,165.

MADISON, James, fourth president of the United States, 1809-17, born in Virginia 1751, died 1836. He was educated at Princeton; elected to the Virginia convention in 1765; became a member of the council of state; took his seat in the Continental congress in 1780 and was there made chairman of the committee of foreign affairs. Under the administration of Jefferson he became secretary of state, and in 1809 he was elected president. During his term of office war was declared with

Great Britain, which Madison prosecuted for three years with alternate defeat and success, until the decisive battle of New Orleans was fought, and peace



James Madison

signed in 1814. Madison retired into private life in 1817.

MADNESS, See Insanity.

MADON'NA, an Italian term of address equivalent to Madam. It is given specifically to the Virgin Mary, like Our Lady in English, and hence pictures representing the Virgin are generally called madonnas.

MADRAS', a maritime city of British India, capital of the presidency of the same name, on the Coromandel coast. Altogether the municipality covers an area of 27 sq. miles, the native and business part being called the Black Town. The chief objects of interest are the citadel of Fort St. George, built in 1639, the cathedral of St. George, Scotch church government house, senate house, revenue buildings, college, etc. There are no manufactures to speak of, but the export and import trade amounts to \$50,000,000 annually. Madras was founded in 1639 by the English, and soon became their chief settlement on the coast. Pop. 509,396.

MADRAS, Presidency of, includes with its dependencies and the state of Mysore the entire south of the peninsula of India. Its extreme length is 950 miles, breadth 450 miles; area, 149,092 sq. miles. There are extensive forests yielding teak, ebony, and other valuable timber trees. The principal vegetable products are rice, wheat, barley, corn, and other grains; sugar-cane, areca, yam, plantain, tamarind, jack-fruit, mango, melons, cocoa-nuts, ginger, tumeric, pepper, tobacco, oil seeds, coffee, and cotton. The wild animals met with are the elephant, tiger, chctah, jackal, wild hog, etc. The Madras administrative authority is vested in a governor, with a council of three members appointed by the queen, and of whom one is the commander-in-chief. For legislative purposes the council is increased by nominations of the governor. In each of the 22 districts there is a collector and a sessions judge. The chief educational institution is the

Madras University, an examining body granting degrees in arts, law, medicine, and engineering. The population is 38,208,609, and the native protected states have in addition a pop. of 4,190,322. The chief languages spoken are the Dravidian, namely, Tamil, Telugu (which are spoken by the great majority of the inhabitants), Canarese, and Malayalam, while Hindustani is the language spoken by the Mohammedans.

MAD'REPORE, a coral-building polyp, forming coral of stony hardness and of a spreading or branching form, hence called tree-coral. Madrepore coral is of a white color wrinkled on the surface and full of little cavities, in each of which an individual polyp was lodged. These polyps raise up walls and reefs of coral rocks with astonishing rapidity in tropical climates. The term is often applied also to other branching corals.

MADRID (má-drid'), the capital of Spain, in New Castile, in the province of Madrid, on the Manzanares, near the center of the Iberian Peninsula. The royal palace, a combination of Ionic and Doric architecture, is one of the most magnificent in the world, being 470 feet each way, and 100 feet high. It contains a small but splendid Corinthian chapel, a library of nearly 100,000 volumes, and a fine collection of ancient armor and

manufactures are of small importance. Madrid only began to be a place of importance under Charles V. and in 1560 Philip II. declared it to be the capital. It is the creation of a century, for it has not increased much since the age of Philip IV. Pop. 512,150.

MAD'RIGAL, a short amorous poem, consisting of not less than three or four stanzas or strophes, and containing some tender and delicate, though simple thought, suitably expressed. The madrigal was first cultivated in Italy, and those of Tasso are among the finest specimens of Italian poetry. The term is also applied to an elaborate vocal composition now commonly of two or more movements, and in five or six parts. The musical madrigal was at first a simple song, but afterward was suited to an instrumental accompaniment.

MADURA', a district of India forming part of the Madras presidency, mostly a plain drained by the Vaigai river; skirted on the southwest by the Travancore Hills; area 8808 sq. miles, pop. 2,608,404. The town has been much improved under British rule. Pop. 105,984.

MADU'RA, an island of the Indian Archipelago, n. e. of Java, and separated from it by the Strait of Madura; 105 miles long, and 30 miles broad; and belonging to the Dutch. Pop. 1,000,000.



Puerta del Sol in Madrid.

coins. Madrid has no cathedral, being only a suffragan bishopric of Toledo, and the churches are few and uninteresting. The bull-fights take place in the Plaza de Toros (bull-ring), a building which is about 1100 feet in circumference, and capable of containing 12,000 spectators. The Prado, nearly 2 miles long, a boulevard on the east of the city, forms the popular promenade, and beyond it is the park. The Royal Museum of Painting and sculpture, in the Prado, contains more than 2000 pictures. The National Library, founded by Philip V., contains 230,000 volumes. The University has an average attendance of 5000 students, and there are numerous colleges and schools, medical, military, law, etc. The

MAELSTROM, a celebrated whirlpool off the coast of Norway, near the island of Moskoe, one of the Lofoddens. With a strong wind from the northwest the whirlpool rages violently, so as to be heard several miles, and to engulf small vessels which approach it.

MAESTO'SO, an Italian musical term meaning in a majestic or lofty style.

MAFEKING, a small town of Bechuanaland, on the railway from Kimberley to Buluwayo, famous for the long stand it made under Col. Baden-Powell against the Boers in the South African war of 1899-1902.

MAGALHAENS (mag'ál-yá-ens), or **MAGELLAN** (ma-gel'an), Fernando de, a Portuguese navigator, who conducted

the first expedition round the world; born about 1470; served under Albuquerque in the East Indies; distinguished himself at the taking of Malacca, in 1511; in 1519 received the command of a fleet of five ships from Charles V. of Spain, with which he sailed westward entered



Magellan.

the strait since called after his name, and discovered the Pacific Ocean. Subsequently he was killed in a skirmish with the natives on one of the Philippines, and his vessels were conducted to Spain by Juan Sebastian del Cano.

MAGAZINE GUN. See Gunnery.

MAGAZINES. See Periodicals.

MAG'DALEN, or **MAGDALENE**, Mary that is, Mary of Magdala, a woman mentioned in the New Testament as having had seven devils cast out of her, as watching the crucifixion, and as having come early to the sepulchre on the resurrection morning. She was erroneously identified as the "woman who was a sinner" (Luke vii. 37), and hence the term Magdalen came to be equivalent to a penitent fallen woman.

MAGDEBURG (mäh'dé-burh), the capital of Prussian Saxony, and a fortress of the first class, on the Elbe, 76 miles w.s.w. of Berlin, chiefly on the left bank of the river, which here divides into three arms. Magdeburg is a place of great antiquity, being a trading center in the 9th century. It early distinguished itself in the Reformation. During the Thirty Years' war the town was besieged, stormed, and sacked by Tilly, when 20,000 persons are said to have been murdered. Pop. 229,663.

MAGELLAN. See Magalhaens.

MAGELLAN, Strait of, separates the continent of South America from Tierra-del-Fuego, 300 miles long; varies in breadth from 5 to 50 miles, and forms communication between the South Atlantic and South Pacific Oceans. The number of obstructing islands makes the channel difficult of navigation. The strait was discovered in 1520 by Fernando Magalhaens.

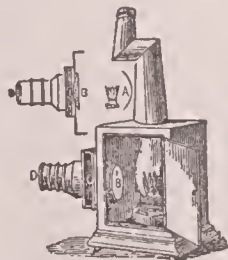
MAGENTA, a brilliant blue-red coloring substance derived from aniline.

MAGI (mā'ji), the hereditary priests among the Medes and Persians, set apart to manage the sacred rites, and preserve and propagate the sacred traditions, acting also as diviners and astrologers. They possessed great influence both in public and private affairs, conducted the education of the princes, etc. Their order was reformed by Zoroaster. The name came also to be applied to holy men or sages in the East.

MAGIC, the art or pretended art or practice of producing wonderful effects by the aid of superhuman beings or of departed spirits or the occult powers of nature. A large proportion of magical rites are connected with the religious beliefs of those using them, their efficacy

being ascribed to supernatural beings. In savage countries the native magician is often sorcerer and priest, and sometimes chief of the tribe. Among the ancient Egyptians magic was worked into an elaborate system and ritual, and it was regularly practiced among the Babylonians and Assyrians, as well as in Greece and Rome. Alexandria, from the 2d to the 4th century, became the headquarters of theurgic magic, in which invocations, sacrifices, diagrams, talismans, etc., were systematically employed. This system, influenced by Jewish magical speculation, had a strong hold in mediæval Europe, and many distinguished names are found among its students and professors. The magic which holds a place still among the illiterate and ignorant classes has come down by tradition in popular folk-lore. The name natural magic has been given to the art of applying natural causes to produce surprising effects. It includes the art of performing tricks and exhibiting illusions by means of apparatus, the performances of automaton figures, etc. See Legerdemain.

MAGIC LANTERN, a kind of lantern invented by Kircher, a German Jesuit (1604-80), by means of which small pictures or figures are represented on the wall of a dark room or on a white sheet, magnified to any size at pleasure. It consists of a closed lantern or box, in which are placed a lamp and a concave mirror (as at A), which reflects the light of the lamp through the small hole of a tube in the side of the lantern, which is made to draw out. At the end of this tube, next to the lamp, is fixed a plane convex lens (B), and at the other a double-convex lens (D). Between the



Magic lantern.

two lenses are successively placed (at C) various slips of glass, with transparent paintings, representing various subjects, which are thrown in a magnified form on the wall or screen opposite to the lantern and spectators. It has been vastly improved of late, and the substitutions of the oxyhydrogen and electric lights for the oil lamp has added much to the effectiveness of its displays; while photography applied to the production of objects has almost indefinitely increased its resources.

MAGISTRATE, a public civil officer invested with the executive government or some branch of it. In this sense a king is the highest or first magistrate in a monarchy, as is the president in a republic. But the word is more particularly applied to subordinate officers, to whom the executive power of the law is committed, either wholly or in part, as governors, intendants, prefects, mayors, justices of the peace, and the like.

MAGNA CHARTA LIBERTATUM, the Great Charter of Liberties, a document forming part of the English constitution, and regarded as one of the mainstays of English liberty, extorted from King John by the confederated barons in 1215. Its most important articles are those which provide that no freeman shall be taken, or imprisoned, or proceeded against except by the lawful judgment of his peers or by the law of the land; and that no scutage or aid shall be imposed in the kingdom (except certain feudal dues from tenants of the crown), unless by the common council of the kingdom. The remaining and greater part of the charter is directed against abuses of the king's power as feudal superior. It originally contained sixty-three clauses; subsequent confirmations altered the number of these till 1225 when it took its final and accepted legal form with thirty-seven clauses. The most accurate and complete copy of the original charter is that preserved in Lincoln Cathedral. The board of commissioners on the public records ordered a facsimile of it to be engraved, and it has been frequently translated into English.

MAGNE'SIA, a white, tasteless, earthy substance, possessing alkaline properties. It is absorbent, antacid, mildly cathartic, and almost insoluble. It is found native in the state of hydrate and carbonate, and exists as a component part of several minerals. In commerce, pure magnesia is generally distinguished by the term calcined magnesia and is readily obtained by exposing its hydrated carbonate to a red heat. The hydrated carbonate goes by the name of magnesia or magnesia alba. The chief use of magnesia and its carbonate is in medicine. See Magnesium.

MAGNESIAN LIMESTONE, a yellowish rock composed of carbonates of lime and magnesia, the latter amounting in some cases to nearly a half. There are several varieties, more or less useful for building or ornamental purposes, which are included under the generic name dolomite. The same name is also given to the whole Permian formation, from this rock being very largely developed in it.

MAGNE'SIUM, the metallic base of magnesia. It may be obtained by decomposing chloride of magnesium by means of potassium. It is of a white color like silver; its luster is metallic and brilliant; it is very malleable, and fuses at a red heat. Heated to redness in oxygen gas, it burns with brilliancy, and combining with oxygen becomes magnesia, or the oxide of magnesium. The magnesium light is rich in chemical rays, and is now employed to some extent in photography. The chief salts are the carbonate, the chloride, the sulphate (Epsom-salt), the phosphates and the silicates, among which are such minerals as chrysolite, meerschaum, soapstone, and serpentine.

MAGNET. See Magnetism.

MAGNETISM, the science which treats of the phenomena exhibited by magnets,—phenomena due to one of those forces which, like electricity and heat, are known only by their effects. The phenomena of magnetism were first observed in the loadstone or magnet

(so named from Magnesia in Asia Minor). The loadstone is a kind of iron ore (magnetic iron ore), and is found in many parts of the world, especially in the Scandinavian peninsula and in Siberia. It has the power of attracting small pieces of iron or steel, and when suspended in such a way as to be able to move freely, always points to what are called the magnetic poles of the earth, that is nearly north and south. A piece of loadstone forms a natural magnet, and has the further remarkable power of giving all its own properties to hard iron or steel when these bodies are rubbed by it. A bar or mass of iron or steel to which the peculiar properties of a natural magnet have been imparted by friction from other magnets or by electric induction is called an artificial magnet. When freely suspended, all magnets, natural and artificial, rest with their lengths in a northerly and southerly direction, and this property is utilized in the well-known compass. They attract iron and other magnetic substances with a force increasing from the middle of the magnet to its extremities, which are called its poles. The magnetism at the two poles is different, that pole which points to the north is distinguished as the north or north-seeking or austral pole, or by the sign plus (+); that which points to the south as the south or south-seeking or boreal pole, or by the sign minus (—). The poles of the same denomination repel each other while those of different names have mutual attraction, thus resembling the two electricities, positive and negative. The intensity of this attraction and repulsion varies inversely as the square of the distance, a law which also governs electrified bodies. Magnetism pervades the earth as electricity does the atmosphere. It assumes a totally different form in different substances; the metals iron, nickel, and cobalt being strongly attracted by the magnet, others such as bismuth, copper, silver, gold, etc., being as strongly repelled. (See Diamagnetic.) The space in the neighborhood of a magnet is called the magnetic field; a piece of soft iron brought into this space becomes magnetic, but it loses its magnetism as rapidly on removal from the field. (See Induction, Magnetic.) Steel has coercive force, in virtue of which it requires time for magnetization, and retains its magnetism on removal from the field. Hard steel may be made magnetic by rubbing it several times in the same direction with a powerful magnet, and hence it is easy to multiply magnets. The most powerful permanent magnets are produced by rubbing bars of steel on electro-magnets (see Electro-magnetism), or by moving them backwards and forwards along the axis of a coil of wire in which an electric current is passing. A bar is magnetized to saturation when its magnetism is as great as it can retain without future sensible loss. When a magnet is broken into a number of pieces each piece is found to be magnetic and its north pole is found to have been directed toward the north pole of the unbroken magnet. When these pieces are put together again poles placed in

contact nullify each other, and the original magnet is reproduced.

Terrestrial magnetism, which pervades the whole earth, is extremely complicated. It becomes manifest by its influence on the magnetic needle, varying with time and place over the earth. One pole of the needle points toward the north, the other toward the south. There are, however, only two lines on the surface of the earth on which it points directly north and south, and where the magnetic and geographical meridians appear to coincide. Elsewhere the needle deviates more or less from the true north. This is termed the declination of the needle, and varies from place to place, and in the course of time at the same place. (See Isogonic.) When a needle is balanced on a horizontal axis so that it can turn in a vertical plane, the extremity attracted by the nearer magnetic pole of the earth points more or less downward. (See Dipping-needle.) The angle thus made is called the dip or inclination, and the lines marking equal inclinations on a map are called isoclinical lines. They intersect the isogonic lines, and the dip increases toward the perpendicular as the magnetic poles are neared. The magnetic poles do not coincide with the geographical poles, the northern being in $70^{\circ} 5' \text{ N.}$ and $96^{\circ} 43' \text{ W.}$ The southern is probably at $73\frac{1}{2}^{\circ} \text{ S.}$ and $147\frac{1}{2}^{\circ} \text{ E.}$ There are two foci of maximum force in the northern hemisphere and two in the southern. In the northern hemisphere the stronger focus is assumed to be in 52° N. and 90° W. , and the weaker in 70° N. and 115° E. In the southern hemisphere the stronger focus is assumed to be in 65° S. and 140° E. , and the weaker probably in 50° S. and 130° E. The earth's magnetism is subject to vast unaccountable commotions or storms of immense extent, which occur at irregular intervals and are of short duration. They are often connected with manifestations of electrical phenomena, such as the aurora borealis, or thunderstorms. These disturbances are made manifest by irregular motions of the magnetic needle. The various phenomena connected with terrestrial magnetism are now automatically recorded, and systematized in the interests of meteorology. The magnetic equator or line of no dip crosses the terrestrial equator in several places, extending alternately on each side, but never deviating more than 12° from it.

MAGNETISM, Animal. See Mesmerism.

MAGNETO-ELECTRICITY treats of the currents of electricity produced in a conductor when its position is changed relatively to a magnetic field (see Induced Current), whereas electro-magnetism (which see) treats of magnetization produced by currents.

MAGNETO-ELECTRIC MACHINES. In magneto-electric machines an electro-magnet of compact form called the armature is caused to rotate near the poles of a powerful fixed magnet, in such a manner that the core of the armature becomes magnetized first in one direction and then in the opposite, by the inductive action of the poles of the fixed magnet. Every change in the magneti-

zation of the core induces a current in the coil wound upon it. Hence currents in alternately opposite directions are excited in this coil, their strength increasing with the speed of rotation. It is now usual in powerful machines of this class to employ electro-magnets as the fixed magnets, and the current which feeds these fixed magnets (called the field magnets) is often the current generated by the machine itself. The machines in this case are called dynamo machines. This name was originally confined to machines which thus supply the current for their own field magnets, but it is now applied to any machine in which the field magnets are electro-magnets. Such machines, of which there is an enormous variety, driven by steam-engines or other powerful motors, are now almost universally employed when electric currents are required on a large scale, as in electric lighting. See the articles Dynamo, Electric Light, Electro-magnet, Electro-magnetism, Electro-motors.

MAGNETOMETER, an instrument employed for observing the magnetic declination, and also for other absolute magnetic measurements. They are of various forms and are usually self-recording. See Declinometer, Dipping-needle.

MAGNIFICAT, the song of the Virgin Mary, Luke i. 46-55: so called because it commences with this word in the Latin Vulgate. It is sung throughout the Western Church at vespers or even-song.

MAGNIFYING-GLASS. See Microscope.

MAGNO'LIA, a genus of trees and shrubs. The species, which chiefly inhabit North America, Northern India, China, Japan, and other parts of Asia, are trees much admired on account of the elegance of their flowers and foliage, and are in great request in gardens. In their native countries some of them attain great height, and have flowers 10 inches across.

MAGOG. See Gog.

MAGPIE, a bird belonging to the crow family. There are several species, two



Magpie.

of which belong to America. The common European magpie is about 18 inches

in length; the plumage is black and white, the black glossed with green and purple; the bill is stout, and the tail is very long. The magpies continue in pairs throughout the year, and prey on a variety of food, chiefly animal. They are determined robbers of other bird's nests, destroying the eggs and young birds. In captivity they are celebrated for their crafty instincts, their power of imitating words, and their propensity to purloin and secrete glittering articles.

MAGRUDER, John B., American soldier, was born in Winchester, Va., in 1810. He served in the Mexican war, in which he commanded a battalion, and was brevetted lieutenant-colonel. At the beginning of the civil war he resigned his commission of captain of artillery and entered the service of the confederacy. He won the battle of Big Bethel and received a brigadier-general's commission. At Yorktown for several weeks he prevented the advance of the national forces, was promoted major-general and took part in the battle of Malvern Hill. In October, 1862, he was given command of the department of Texas, and on January 1, 1863, he recaptured Galveston from the Union forces. At the close of the war he entered the army of the usurper, Maximilian, in Mexico, in which he held the rank of major-general. After the execution of Maximilian he returned to Texas and lived in retirement. He died in 1871.

MAGYARS, the Hungarians. See Hungary.

MAHAN, Alfred Thayer, American naval officer and author, was born at West Point, N. Y., in 1840. During the civil war he saw service in the South Atlantic and Gulf Squadrons. He was made lieutenant-commander in 1865, commander in 1872, and captain in 1885. From 1886 to 1889, and again from 1892 to 1893, he was president of the Naval War College at Newport. At his own request he was retired from active service in November, 1896, but during the war with Spain served on the Naval War Board, and in the following year was one of the United States representatives to the Peace Congress at The Hague. Captain Mahan's reputation rests largely upon his work as an author. His great work, *Influence of Sea Power Upon History, 1660-1783*, received recognition both at home and abroad as a work of the utmost importance. Among his other works are *The Navy in the Civil War*, *Influence of Sea Power upon the French Revolution 1793-1812*, *Life of Farragut*, *Life of Nelson* and *The Interest of America in Sea Power, Present and Future*.

MAHA'LEB, a species of cherry, whose fruit affords a violet dye and a fermented liquor like kirsch-wasser. It is found in the middle and south of Europe. Its flowers and leaves are used by perfumers, and its wood by cabinet-makers.

MAHANADI (ma-hä'na-dē; or Mahanuddy) **RIVER**, a river in Southern Hindustan which flows through the Central Provinces and Orissa, falling by several mouths into the Bay of Bengal, after a course of 520 miles.

MAHANOY, a town in Schuylkill co., Pennsylvania, 80 miles from Philadel-

phia, in the middle of a rich anthracite coal district. Pop. 16,175.

MAHARA'JAH (literally, a great king), a title applied in courtesy to every Indian rajah, or to any person of high rank or deemed holy.

MAHDI (mä'dē; Arabic, the director or leader), a name assumed by some of the successors of Mohammed, particularly applied to the twelfth imam, the lineal descendant of Mohammed, born A.D. 868. He mysteriously disappeared, being probably murdered by a rival, and the belief was that he would remain hidden until the "last days," when he would reappear, and at the head of the faithful spread Mohammedanism over the world. Many professed Mahdis have appeared from time to time in Africa as well as Asia, the latest being Mohammed Ahmed, the leader of the Soudanese insurrection (1883-85). He was born at Dongola in 1843, died 1885. He studied Mohammedan theology at Khartoum and Berber, and at 25 years of age he retired to the island of Aba in the White Nile, where he lived in solitude for fifteen years. At the age of forty he took up the prophetic rôle, and his short victorious career began. See Egypt, Soudan.

MAHMUD (mä'mud), Sultan of Ghazna, the founder of the Mohammedan Empire in India, born at Ghazna about 970, died 1030. His father, Sabaktagin, governor of Ghazna, owed a nominal allegiance to Persia, but was really independent. On his death Mahmud put aside his elder brother; formed an alliance against the Persian monarch, overthrew his kingdom and laid the foundation of an extensive empire in Central Asia (999). He then turned his attention to India, and in a series of twelve invasions secured a great amount of treasure, and vastly extended his power.

MAHMUD I., Sultan of Turkey, born 1696; reigned 1730-50.—**Mahmud II.**, Sultan of Turkey, born 1785, died 1839; placed on the throne by the Janizaries after the murder of his predecessor, 1808. The chief events of his reign are the war with Russia from 1808 to 1812, which cost him Bessarabia and the provinces of Servia, Moldavia, and Wallachia, as settled by the treaty of Bucharest; the war of Greek independence, which ended in the separation of that country, and the destruction of the Turkish fleet at Navarino, 1820-28; the extermination of the Janizaries, 1826; the treaty of Adrianople, with the Russians, who were on the point of entering Constantinople, 1829; the independence of Egypt under Mehemet Ali, and the new treaty of Unkiar-Skelessi with the Russians, 1832-33.

MAHOG'ANY, the wood of a lofty and beautiful tree, indigenous to Central America and the West Indies. It grows most abundantly and attains its greatest development between 10° n. lat. and the Tropic of Cancer. It reaches maturity in about 200 years, and grows to a height of 40 to 50 feet, diameter 6 to 12 feet. The wood is hard, compact, reddish-brown, and susceptible of a brilliant polish. It is one of the best and most ornamental woods known, and is of universal use in the making of furniture.

It is imported chiefly from Mexico and British Honduras. That which is imported from the West Indies is called



Mahogany.

"Spanish" mahogany, and is the most valued.

MAHOMET. See Mohammed.

MAIDENHAIR, the name given to an elegant fern with a creeping scaly rhizome, and bipinnate fronds, the leaflets of which are between rhomboidal and wedge-shaped, margined with oblong sori, and more or less deeply lobed.

MAIDENHAIR-TREE, a deciduous tree of the yew family, a native of Japan, so called from the likeness of its leaves to the maidenhair fern.

MAID OF ORLEANS. See Joan of Arc.

MAIDS OF HONOR. See Honor, Maids of.

MAIL, Coat of. See Arms and Armor.

MAIL-COACHES. See Coach.

MAIMANSINGH, a British district in the Dacca division, Bengal; area, 6287 sq. miles. Pop. 3,472,186.

MAINE, one of the eastern and maritime United States of North America bounded on the east and northeast by New Brunswick, north and northwest by Quebec, west by New Hampshire, and southeast by the Atlantic Ocean; area, 33,040 sq. miles. Maine is nearly as large as all the rest of the New England states combined, and is thirty-fifth in size among the states of the Union. It is mostly an elevated country, but hilly rather than mountainous. The state is almost completely traversed by navigable rivers, the principal of which are the Penobscot and Kennebec; and in the



Seal of Maine.

interior are numerous lakes. The coast abounds with islands, the largest of which is Mount Desert, 15 miles long and 12 miles broad; and is indented with

numerous bays and inlets, the principal of which are Penobscot, Casco, and Passamaquoddy. Grass lands are extensive, and Indian corn, wheat, barley, rye, and flax are the chief crops. The leading industry is the production of lumber. Not long ago the forests covered about one-half the surface of the state, but they are rapidly diminishing. Marble, slate, limestone, and granite are abundant, and iron, lead, tin, copper, and zinc are found in considerable quantities. The fisheries give employment to a large portion of the population; and other industries are ship-building, the manufacture of cotton and woolen fabrics, etc. There are about 1100 miles of railways, and lines of steamers ply regularly from the larger ports. Augusta, on the Kennebec, is the seat of government, but Portland is the principal town, and a seaport of great importance. Maine was admitted into the Union on March 15, 1820, having been until that time an integral part of Massachusetts. The earliest explorers of the territory were the Cabots in 1497, followed by Verrazzano in 1524, and Gomez a year later. Gomez gave the name to Penobscot Bay and river, and the French built a fort on the river in 1526. In 1603 Henry IV. of France, granted to a Protestant nobleman, named De Montz a charter, which, in the liberal fashion of those days, purported to convey title to all the land between 40° and 46° n. latitude. Two years later James I. of England gave to an English company of adventurers a charter covering everything from 34° to 45° n. latitude. These grants created a double jurisdiction over the greater part of Maine and gave rise to a series of conflicts which extended over a century. In 1604 De Montz established a settlement on Neutral Island in the St. Croix river, and three years later the English founded a town at the mouth of the Kennebec. Here Capt. John Smith made his headquarters and built a fleet of boats, with which he explored New England. In 1622 the New England council gave to Sir Ferdinando Gorges and Capt. John Mason the country between the Merrimac and the Kennebec, and for sixty miles inland, which was thenceforward known as Maine. Gorges ruled as lord-palatine under a new charter obtained from Charles I. of England, in 1639, and established his capital at Georgiana (now York), the first chartered city in America. Troubles grew out of the confusion of jurisdiction and in the year 1677 Massachusetts bought the shadowy title of Gorges from his heirs for \$6,250. In 1691 a new charter given by William and Mary merged all the provinces from Plymouth to Acadia in the Province of Massachusetts. For the next 120 years Maine was practically merged in Massachusetts. Maine contributed men to the revolutionary struggle and was represented in the Continental congress. After the close of the war in 1812 Great Britain claimed a great deal of territory which had long been under the jurisdiction of Massachusetts, and the legitimate limits of Maine were cut down almost 6,000 sq. miles when a final treaty was made. The only important

subject of legislation in the state of other than local interest has been that of prohibition. After some tentative lawmaking, a stringent prohibitory law, passed in 1858 was incorporated into the constitution, and has remained in force ever since. Prohibition on the whole has not turned out entirely successful, and evasions of the law are frequent. Before 1856 Maine was generally democratic in state elections, and only once (1840) voted against the democratic candidate in presidential elections. Since 1856 it has been emphatically republican except in the years 1878 and 1880, when the democrats and greenback party in fusion succeeded in electing their candidate for governor. In 1891 the Australian ballot law was passed. Pop. 756,000.

MAINE, University of, a co-educational state institution at Orono, Maine, founded on the national land grant in 1865 under the name of the State College of Agriculture and Mechanic Arts. The present name was assumed in 1897. The university comprises the colleges of arts and sciences, agriculture, engineering, and pharmacy, and the school of law. The Maine Agricultural Experiment Station is a department of the university. The university confers the bachelor's and master's degree in arts, philosophy, science, and law, the degrees of civil, mechanical, and electrical engineer, and pharmaceutical chemist. Military instruction is required by law. Students are admitted upon examination or on a certificate from an accredited school. During 1902 courses were begun in mining and naval engineering, a summer school and a correspondence course were established, and uniform entrance requirements with all other Maine colleges were adopted.

MAINTENON (man-té-nōn), Francoise D' Aubigné, Marchioness de, wife of Louis XIV. and grand-daughter of Henry the Fourth's friend Theodore Agrippa D'Aubigné, was born in 1635. Left quite destitute in her tenth year, Mademoiselle D'Aubigné spent her youth in dependence on her rich relatives, and was glad to contract a nominal marriage with the famous wit Scarron, a deformed, old, and infirm man. On Scarron's death she was intrusted with the charge of the children born to Louis XIV. by Madame de Montespan. She assumed this office in 1669, and played her cards so dexterously that the king married her privately, probably in 1685, when her age was fifty and his own forty-seven. For the remaining years of his life she was his most confidential advisor. She was a virtuous woman, and a devout and bigoted Catholic, ambitious and resolute but disinterested and charitable. Her published letters give her a creditable place in French literature. She died in 1719, at the nunnery or school of Saint Cyr, which she herself had founded.

MAINZ (mints; English, Mentz; French, Mayence), a fortified town of Germany, in the grand-duchy of Hesse, finely situated on the left bank of the Rhine, opposite the mouth of the Main, 20 miles w.s.w. Frankfort. Pop., including garrison, 84,251.

MAITLAND, William, commonly known as Secretary Lethington, a Scottish statesman, eldest son of Sir

Richard Maitland, born about 1525, died 1573. On Queen Mary's arrival in Scotland he was chosen one of her principal ministers. After Darnley's murder he conspired to effect Mary's escape from Lochleven. The regent Moray had him arrested in 1569 as an accessory to Darnley's murder. He was set at liberty by Kirkcaldy of Grange, and after the assassination of Moray he became the life and soul of the queen's party, and kept up an active correspondence with Mary. In 1571 he joined Kirkcaldy in Edinburgh Castle; was proclaimed a traitor by the parliament, and attainted with his two brothers. On the surrender of Edinburgh Castle Kirkcaldy and his brother were hanged, but Maitland died in prison in Leith, presumably by his own hand.

MAIZE, Indian corn, a genus of plants commonly cultivated in the warmer parts of the world, where it answers a purpose similar to that of wheat in more northern countries. The common maize or Indian corn is a monœcious grass, of vigorous growth, with stems not more than 2 feet high in some varieties, and reaching the height of 8 or even 10 feet in others. The grains are large, compressed, and packed closely in regular parallel rows along the sides of a receptacle many inches long. In large varieties the ear or cob is often 1 foot long and 2 or 3 inches in thickness. Maize is extensively cultivated in America, where it forms almost the only bread eaten by many of the people. Its flour, though



Maize.

exceedingly nourishing, is not glutinous, and must accordingly be mixed with wheat, rye, or other flour before it can be baked. In America large quantities of unripe grain are roasted till they split, and are then eaten under the name of popcorn. From the green stems a syrup is expressed, which is fermented and converted into a kind of spirits. Paper has been made from maize fibres. It is also cultivated throughout a great part of Asia and Africa, and in several countries of the south of Europe, as Spain and Italy. The green stems and leaves form nutritious food for cattle, and it is sown and cut green for this purpose.

MAJOLICA, or **MAIOLICA**. See Faience.

MAJOR, in music, designates in general a larger in contradistinction to a smaller interval of the same denomination, called a minor interval; thus a major tone is the interval between two tones having the proportion to each

other in number of vibrations of 8:9; a minor tone the interval between two tones in the ratio of 9:10; a major third is an interval of two tones (major and minor); a minor third an interval of a tone and semitone. The major mode is one of the two recognized modern modes (or forms of the scale), in which the first third in the scale is a major third, in contradistinction to the minor mode, in which the first third is a minor third.

MAJOR, the rank next above a captain, and below a lieutenant-colonel. In the United States the command appropriate to the grade is: Infantry, a battalion; cavalry, a squadron; artillery, two or more batteries.

MAJOR'CA, an island in the Mediterranean belonging to Spain, the largest of the Balearic group, between Iviça and Minorca; greatest length, 58 miles; greatest breadth, 45 miles; area, 1420 sq. miles. Chief town, Palma. Pop. 244,265.

MAJOR-GENERAL, in the United States Army, the rank next above that of brigadier-general, and below that of lieutenant-general. The command appropriate to his grade is four regiments, or in time of peace a department. In war he would command a division or a corps.

MAJORITY, the period when the legal disabilities and peculiar advantages and privileges incident to infancy cease. A person upon attaining his majority has a last opportunity to disaffirm and avoid legal transactions to which he was a party during the period of his minority, and which were voidable because of his disability. Certain privileges of citizenship, such as voting and holding office, usually commence at this time.

MALABAR', a maritime district of British India, in the presidency of Madras, on the west coast; area 5765 sq. miles. Pop. 2,652,565. The name Malabar is often applied to the whole extent of coast country as far north as Bombay.

MALAC'CA, a territory and town forming part of the British colony of the Straits Settlements, on the west coast of the Malay peninsula, on the Strait of Malacca. It extends about 40 miles along the shore of the strait, and about 25 miles inland. Area 875 sq. miles. Pop. of town 15,000; of the district 95,487.

MALACCA, Strait of, the channel between the Malay peninsula and the Island of Sumatra, extending from latitude 1° to about 6° n. Entire length, about 520 miles; breadth, varying from 25 miles to 200 miles.

MALACCA CANE, a cane made from the wing-leaved, erect, slender, cane-stemmed palm, which, when dressed, is of a brown color, sometimes mottled or clouded. It is brought from Singapore and Malacca, but is chiefly produced in Sumatra.

MALACHI (mal'a-kī), the twelfth and last of the minor prophets. Nothing is known of the history of the writer, and it is even doubtful if Malachi (Messenger of Jehovah) be a proper name or an assumed epithet. The book evidently belongs to the latter part of the governorship of Nehemiah, about B. C. 420. It contains denunciations of the sins of the

Israelites, and predicts the coming of the Messiah and the conversion of the Gentiles.

MALACHITE (mal'a-kīt), a carbonate of copper, a dark emerald-green color, and of a laminated, fibrous, or massive structure. The finest specimens are obtained from Siberia, but it is found in many places all over the world. Fibrous malachite, when finely pulverized, is used as a paint; massive malachite is made into boxes, knife-handles, table-slabs, and other ornamental articles, and is susceptible of a beautiful polish. Blue malachite or azurite contains a larger proportion of carbonic acid.

MAL'AGA, a seaport of southern Spain, in Andalusia, capital of a province of the same name, on the Mediterranean. It was anciently called Malaca. The climate is one of the mildest and most equal in Europe. Pop. 130,109.—The province of Malaga has an area of 2822 sq. miles; pop. 511,989. It is traversed in all directions by offsets of the Sierra Nevada. The valleys are fertile and generally well cultivated, yielding cereals, grapes, oranges, lemons, figs, almonds, sugarcane, etc.

MALAGA WINE, a sweet Spanish wine produced in the province of Malaga. It is one of the "muscatel" wines, and is rich, luscious, and full of body.

MALA'RIA, air tainted by miasmata or deleterious emanations from animal or vegetable matter, especially the exhalations of marshy districts which produce fevers. A class of diseases, among which intermittent and remittent fevers occupy a prominent place, have been known from a very early period to be especially prevalent in marshy districts, where they are promoted at particular seasons by certain conditions of heat and moisture. The noxious agents by which these results are produced have been attributed to the products of vegetable decomposition, the decomposition of animal tissues being regarded as giving rise to similar miasmata. Recent research seems to show that, whatever decomposition may have to do with malaria, the germs of malarial diseases are enabled to enter the human system through the bites of mosquitoes, and that the clearance of these from malarial districts is followed by the disappearance of malarial fevers.

MALAY ARCHIPELAGO, also known as the Indian, Asiatic, or Eastern, the great group of islands situated to the southeast of Asia, and washed on the west by the Indian and east by the Pacific Ocean. Within these limits lie some of the largest and finest islands in the world, as Borneo, Sumatra, Java, Celebes, the Philippines, etc., but New Guinea is not ranked as belonging to the group. The chief of the smaller islands are Moluccas or Spice Islands, Billiton, Banca, Madura, Bali, Lombok, Sumbawa, Flores, Timor. The small islands may be truly called innumerable. A large portion of the archipelago is really or nominally under the sway of Holland, and this portion is frequently called the Dutch East Indies.

MALAY PENINSULA, the most southern part of continental Asia, the long, narrow projection that stretches first s. and then s. e. from Siam and Burmah.

It is connected with lower Siam by the Isthmus of Kra, has on the e. the Gulf of Siam and the China Sea, and on the w. the Strait of Malacca. It varies in width from 45 miles at the n. to about 210 miles. The area is about 70,000 sq. miles, and the pop. is variously estimated at from 650,000 to 1,000,000 including large numbers of Chinese.

MALAYS, the name of a race of people inhabiting the Malay Peninsula, and spread over all the Asiatic Archipelago. They claim to have had their native country in the Highlands of Sumatra, where they established the once powerful state of Menangkabo, now subject to the Dutch. In physical appearance they are rather under the middle height, light brown in color, with black, straight hair, high cheek-bones, black and slightly oblique eyes, and scanty or no beard. The civilized Malays profess the Mohammedan religion. They are said to be of a taciturn, undemonstrative disposition; naturally indolent, treacherous in their alliances, and addicted to piracy.

MALCOLM (mál'kom) I., King of Scotland, reigned from 943 to 954.—Malcolm II. succeeded Kenneth II. in 1005. In his reign Lothian and Strathclyde became parts of the Scottish kingdom. He was assassinated at Glamis in 1034. He was the last direct male descendant of Kenneth MacAlpine.—Malcolm III., surnamed Canmore (Great Head), born about 1024, slain near Alnwick, 1093. His father, Duncan, being slain by Macbeth (1040), he sought aid from Siward of Northumbria, and was also assisted by Edward the Confessor. On the defeat and death of Macbeth he was crowned at Scone in 1058. In 1068 he granted asylum to Edgar Atheling, his mother, and two sisters (one of whom, Margaret, he married in 1070), with a number of Saxon exiles. His reign, which was mostly taken up with wars with England, had nevertheless an important bearing on the civilization and consolidation of Scotland.—Malcolm IV. (the Maiden) succeeded his grandfather, David I., in 1153. He surrendered Northumberland and Cumberland to Henry II. in 1157. Died at Jedburgh in 1165, at the age of twenty-four. See Scotland.

MALCOLM, Sir John, a distinguished soldier and diplomatist, was born near Langholm, in Dumfriesshire, 1769; died in London 1833. He entered in 1782, as a cadet, the service of the East India Company. He was three times ambassador to Persia, and did excellent service in the pacification of India after the wars of Holkar and the Peishwa. In 1827 he was appointed governor of Bombay, which post he continued to fill until 1831, when he finally returned to Britain. He received the honor of knighthood in 1812.

MALDEN, a city in Middlesex co., Mass., 5 miles n. of Boston, on the Malden river. It has extensive manufacturing industries, and a pop. of 40,160.

MAL'DIVE ISLANDS, a remarkable chain of islands in the Indian ocean. The larger islands are richly clothed with wood, chiefly palm, and are fertile in fruit and in various kinds of edible roots; they also produce millet, and

abound in cocoa-nuts, fowls, and all descriptions of fish. Pop. 150,000 to 200,000.

MALEBRANCHE (mál-brānsh), Nicholas, a French philosopher, born in 1638, died 1715. In 1673 he published his treatise *De la Recherche de la Vérité*. The doctrines of this celebrated work are founded upon Cartesian principles.

MALLARD. See Duck.

MALLEABILITY, the property of being susceptible of extension by beating; almost restricted to metals. The following is the order of malleability of the metals: Gold, silver, copper, platinum, iron, aluminium, tin, zinc, lead, cadmium, nickel, cobalt. Ductility and malleability are nearly allied, but they are seldom possessed in the same proportion by the same metal.

MAL'LOREY, Stephen Russell, cabinet officer in the confederacy, was born at Trinidad, W. I., in 1813, and in 1832 was appointed by President Jackson inspector of customs at Key West. From 1851 to 1861 he represented Florida in the United States senate. In 1861 he was appointed secretary of the confederate navy, then without a ship. After the war he was taken prisoner, but in 1866 was released on parole. He died in 1873.

MALLOW, the mallow is a common and widely diffused species of plants, possessed of mucilaginous properties. The whole plant is used in fomentations, cataplasms, and emollient enemas. When fresh the flowers are reddish-purple,



Common mallow

but on drying become blue, and yield their coloring principle both to water and alcohol. The alcoholic tincture furnishes one of the most delicate of reagents for testing the presence of alkalies or acids.

MALMAISON, a historic chateau in France, department of the Seine, 5 miles w. of Paris, once the property of Richelieu. It was the favorite residence of the Empress Josephine, wife of Napoleon I.

MALMO (mál'meu), a seaport of Sweden, capital of the laen or prefecture of Malmöhus, situated on the eastern shore of the Sound, opposite Copenhagen. The manufactures and other industries are considerable, and the shipping trade of the port is large. Pop. 62,954.—The laen of Malmöhus is very fertile; has an area of 1781 sq. miles; pop. 413,400.

MALT, grain, usually barley, steeped in water and made to germinate, the starch of the grain being thus converted into saccharine matter, after which it is dried in a kiln, and then used in the

brewing of porter, ale, or beer, and in whisky distilling. One hundred parts of barley yield about ninety-two parts of air-dried malt. See Brewing.

MALTA, an island in the Mediterranean belonging to Britain. The most important indentation is the double bay on which the capital, Valetta, stands. The greatest elevation of the island is about 750 feet. The soil is thin, and rests on a calcareous rock; in some parts earth has been brought from Sicily and put down. Corn, cotton, potatoes, and clover are the chief crops. Both the vine and olive are cultivated, and fruit, particularly figs and oranges, is very abundant. The manufactures consist of cotton goods, lace, jewelry, etc. The central position of Malta in the Mediterranean makes Valetta an invaluable naval station. It has, in consequence, been provided with excellent docks and very strong fortifications. The climate is very hot in summer, but pleasant and healthy in winter, attracting many visitors at this season. Malta passed successively through the hands of the Phœnicians, Greeks, and Carthaginians, and was finally attached to Rome during the second Punic war. After the fall of the Roman Empire it was siezed at different times by Vandals, Goths, and Saracens. From the last it passed to Sicily, and followed its fortunes till 1522, when Charles V. granted it to the order of St. John of Jerusalem. In 1798 the grand-master surrendered it without defense to Napoleon. It was taken by the British in 1800, and finally annexed by them in 1814. The executive government is in the hands of a governor and council. By a new constitution adopted in 1888 the legislative council consists of the governor and the members of council (6), with 14 members elected by the constituencies into which Malta and the islands of Gozo and Comino have been divided. The people are mainly of Arabic race and speak a kind of Arabic mixed with Italian. Italian and English are also spoken. The total pop., inclusive of the garrison, is 192,000.

MALTESE CROSS. See Cross.

MALTESE DOG, a very small kind of spaniel, with long silky, generally white hair and round muzzle. They are lively and good-tempered, and make agreeable pets.

MALTHA, a variety of bitumen, viscid and tenacious, like pitch. It is unctuous to the touch, and exhales a bituminous odor.

MALTHUS, Rev. Thomas Robert, English political economist, born 1766; died 1834. In 1798 he first published the views with which his name is associated in his *Essay on the Principles of Population as it Affects the Future Improvement of Society*. It was improved and matured in subsequent editions. His leading principle is that population, when unchecked, goes on increasing in a higher ratio than the means of subsistence can, under the most favorable circumstances, be made to increase; that the great natural checks to excessive increase of population are vice, misery, and moral restraint; and the great business of the enlightened legislator is to diminish the

first two and give every encouragement to the last.

MALVA'CEÆ, the mallows, a large natural order of exogenous plants. A large proportion of the order consists of herbaceous or annual plants, inhabiting all the milder parts of the world, but found most plentifully in hot countries. Several species are of essential service to man. As emollients they are well known in medical practice. The hairy covering of the seeds of the various species forms raw cotton. The inner bark of many species yields fibre of considerable value. Many species are splendid flowering plants.

MAM'ELUKES, or **MAMALUKES** (Arabic, "slaves"), the former mounted soldiery of Egypt, consisting originally of Circassian slaves. As early as 1254 they became so powerful that they made one of their own number sultan, this dynasty continuing till 1517, when it was overthrown by Selim I. They still continued to be virtual masters of the country, however. They suffered severely in opposing the French at the end of the 18th century, and in 1811 Mehemet Ali caused a general massacre of them throughout Egypt.

MAMMA'LIA, the highest class at once of the Vertebrata and of the animal kingdom, including those warm-blooded animals we familiarly term "quadrupeds," the whales and other fish-like forms, and man himself. Their distinctive characteristic is that the female suckles the young on a secretion peculiar to the class, furnished by the mammary glands of the mother, and known as milk. The skin is always more or less covered with hairs, which are found in many forms, from the finest wool or silky down to large, coarse bristles and even spines. The skeleton exhibits a uniformity of essential structure, and in most points agrees with that of man. The cavity of the thorax or chest is bounded by the ribs, which vary greatly in number, but generally correspond to that of the dorsal vertebræ. The skull forms a single piece composed of bones immovably fastened together, to which is articulated the lower jaw, composed of two halves united at the chin. The skull is joined to the spine by means of two condyles which fit into the first cervical vertebra. The limbs, like those of all other Vertebrata, are never more than four. The front limbs are invariably present, but in cetaceans and such allied forms as the dugongs and manatees the hinder limbs are either completely suppressed or present only in a rudimentary state. The limbs are generally well developed, and are most commonly adapted for terrestrial progression; some are suited for burrowing, others for climbing, those of the cetaceans and seals for swimming, while some (the bats) have the fore limbs developed into a kind of wing. Teeth are present in most mammals; but they are only represented in the embryo in the whale-bone whales, and are entirely absent in the anteater, pangolin, and echidna. The chest or thorax in all mammals is separated from the abdominal cavity, by a complete diaphragm or "midriff," which thus constitutes a great muscular partition between these cavities, and



PEOPLES OF THE EARTH, OR TYPES OF MEN

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|---------------|----------------|-------------------|----------------|--|--|----------------|--------------------|
| EUROPE | | | AFRICA | | | AMERICA | |
| 1. Icelandic | 8. Lapp | 17. Bulgarian | 38. Sudanese | | | | 46. Eskimo |
| 2. Norwegian | 9. Finn | 18. Montenegrin | 39. Zulu | | | | 47. Mexican |
| 3. Swede | 10. Turk | 19. Caucasian | 40. Hottentot | | | | 48. North American |
| 4. Swiss | 11. Greek | 20. Magyar | 41. Bushman | | | | Indian |
| 5. English | 12. Italian | ISLANDS | 42. Abyssinian | | | | 49. Aleut. |
| 6. Russian | 13. Portuguese | 21. Samoan | 43. Kafir | | | | |
| 7. Pole | 14. French | 22. Fijian | 44. Somali | | | | |
| | 15. German | ASIA | | | | | |
| | 16. Basque | 23. Australian | | | | | |
| | | 24. New Zealander | | | | | |
| | | 25. Tasmanian | | | | | |
| | | 26. Japanese | | | | | |
| | | 27. Aino, Japan | | | | | |
| | | 28. Chinese | | | | | |
| | | 29. Tibetan | | | | | |
| | | 30. Burmese | | | | | |
| | | 31. Hindu | | | | | |
| | | 32. Siamese | | | | | |
| | | 33. Arab | | | | | |
| | | 34. Persian | | | | | |
| | | 35. Jeanian | | | | | |
| | | 36. Malay | | | | | |
| | | 37. Korean | | | | | |

also forms the most important agent in effecting the movements of the chest during respiration. Within the thorax the heart and lungs are contained; while the abdomen and its lesser pelvic cavity contain the organs relating generally to digestion, excretion, and reproduction. The stomach, generally simple, may, as in some monkeys, in the kangaroos, in the pig, and most of all in the ruminants, exhibit a division into compartments. A liver and pancreas are present in all Mammalia. The lungs agree in essential structure with those of man, as also does the heart with its four chambers—right and left auricles and right and left ventricles. The red corpuscles of the blood are non-nucleated, and are circular in shape except in the case of the camels. All mammals with the exception of the monotremes are viviparous but there are considerable differences in the relations subsisting between mother and young before birth, thus leading to the division into placental and aplacental mammals. Man and all other mammals except the monotremes and marsupials belong to the latter division. All mammals possess mammary or milk glands, which, however, may differ chiefly in number and position throughout the class. In the classification of this important group authorities differ somewhat, but the mammals may be divided into the following groups: man, apes and monkeys, the prosimians or lemurs, the bats, the insect-eaters, the flesh-eaters, the seals, the whales and dolphins, the sea cows, the elephants, the odd-toed ungulates, the even-toed ungulates, the gnawers or rodents, the edentates, the marsupials, or pouch-bearing mammals, and the monotremes.

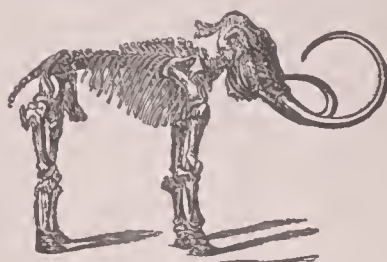
MAMMARY GLANDS, the milk-producing organs, the distinctive mark of the mammals. These structures present in man an essentially lobular structure. The lobes are divisible into smaller lobules, which consist ultimately of groups of vesicles which open into minute ducts converging into larger channels which lead to the milk reservoirs at the nipple. The nipple itself is composed of unstriped muscular fibres and areolar tissue. It also possesses erectile powers, and blood-vessels are in consequence freely distributed to it. These glands, save in exceptional instances, are undeveloped in the male. They are always in pairs on some part of the ventral surface of the body, but in number and position they vary much in the various groups.

MAMMEE'-TREE, or **WEST INDIA APRICOT**, a tall handsome tree bearing a fruit about the size of a cocoa-nut. This has two rinds inclosing the pulp which is firm, bright yellow, and has a pleasant taste and smell.

MAMMON, a Syriac word used in St. Mathew as a personation of riches or worldliness. There does not appear to have been any idol in the east receiving divine honors under this name.

MAMMOTH, a species of extinct elephant, the fossil remains of which are found in European, Asiatic, and North American formations. Geologically speaking, the mammoth dates from the Post-pliocene period. It survived the

glacial period, and lived into the earlier portion of the human period; its remains having been frequently found associated with human remains, and its figure carved on bone. It appears to have been widely distributed over the northern hemisphere, but never south of a line drawn through the Pyrenees, the Alps, the northern shores of the Caspian, Lake Baikal, Kamtchatka, and the Stanovoi mountains. It has large curved tusks, and shaggy hair. The bones and tusks have been found in great abundance in Siberia; and an entire carcass which had



Skeleton of mammoth.

been preserved in the ice and latterly thawed out, was discovered near the end of the 18th century on the banks of the river Lena, in such a perfect state that the flesh was eaten by dogs, wolves, and bears. Its skin was perfectly preserved, and was seen to be clothed with a furry wool of reddish color, interspersed with black hairs. The skeleton and other parts of this animal are preserved in the St. Petersburg Royal Museum. It must have been twice as bulky as the elephants at present living.

MAMMOTH CAVE, a stupendous cave in Kentucky, near Green River, about 80 miles s.s.w. of Louisville. It is one of a large series of vast caverns here formed in the limestone rock, and which are found over an area of 6000 miles in Kentucky, Tennessee, and Indiana. It has been penetrated 14 miles, and has many windings and off-shoots, some of them but imperfectly explored. It is a dry cave, and the remains of its stalactite and stalagmite formations are dusty and dilapidated; consequently it is more remarkable for its extent, the size of its halls, and height of its domes, than for the variety or beauty of its scenery. It contains several small lakes or rivers, the largest, Echo river, being more than half a mile long. It rises and falls according as Green river is in flood or otherwise, there being an underground connection between them. The animals of the cave include blind wingless grasshoppers, beetles, rats, etc., and the viviparous blind fish *Amblyopsis*.

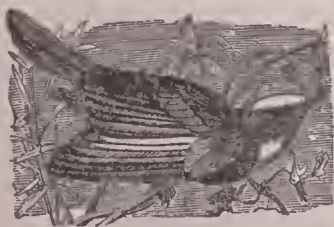
MAMMOTH TREES. See *Sequoia*.

MAN, the most highly organized member of the animal world. The endeavor has often been made in classification to separate man from the brute creation. One system, expressing a vast gap between the *Quadrumana* and man, classifies man in the order *Bimana* ("two-handed"), the highest division of the Mammalian class; and relegates the monkeys and apes to the lower and distinct order—that of the *Quadrumana* ("four-handed"). The more recent arrangements, however, classify man and the monkeys in one order, making

man the highest family or group of this order. From the purely anatomical point of view the differences which separate the anthropoid apes from man are in some respects less than those which separate these higher apes from apes lower in the scale. But the mental or psychical endowments of man oblige us to remove him far above the highest *Quadrumana*; and even the characters by which he is anatomically separated from the highest apes form a very distinct and appreciable series. The first grand characteristic of man is his erect position and bipedal progression. The lower limbs, with the feet broad and plantigrade and the well-developed heel, are devoted exclusively to progression and supporting the weight of the body; while the upper limbs have nothing to do with progression, but subserve prehension entirely. The bones of the face in man do not project forward, while they are elongated in a downward direction; and the face and forehead are in the more civilized races situated nearly in the same plane, so that the face immediately underlies the brain. Similarly the development of a distinct chin is also a peculiarly human feature, and one which in the highest varieties of mankind becomes most marked. The great cranial capacity of man, or the greater size of the cranial or brain portion as compared with the facial portion of the skull, forms another noteworthy and distinctive character of the human form. The brain convolutions also are more numerous and complex than is the case with any other mammal. The teeth of man are arranged in a continuous series, and without any diastema or interval. The development of hair too is very partial. The gorilla presents of all the apes the nearest approach to the human type taken in its entirety; but it differs in the relative number of vertebræ (13 dorsal and 4 lumbar, to 12 and 5 respectively in man), in the order of dental succession and in the presence of the interval or diastema, in the less prominent muscular development of the buttocks and calves, and in other minor differences. The orangs most closely approach man's structure in the number of ribs and in the form of the cerebrum, while they exhibit the greatest differences from him in the relative length of the limbs. The chimpanzees are most anthropoid in the shape of the cranium, in the arrangement and succession of the teeth, and in the length of the arms as compared with that of the legs. Of the higher apes the gibbons are those furthest removed from the human type of structure. Chief among the psychical features, or rather among the results of the operation of the principle of mind, we note the possession of the moral sense of right and wrong. The possession of an articulate language, by which he can communicate his thoughts, is also the exclusive possession of man, and draws a sharp line of separation between him and all other animals. With regard to the geological history of man, the earliest traces yet discovered belong to the Post-pliocene deposits in conjunction with existing species of shells and some extinct species of mammals. Man's

advent upon the earth is consequently referred to a period much anterior to that which former limits and theological ideas prescribed. Among the modern theories regarding the origin of man may be noted those of (1) Darwin; that man is directly descended from an extinct form of anthropoid ape, with a tail and pointed ears, arboreal in its habits and an inhabitant of the Old World; further, that man has diverged into different races or sub-species, but that all the races agree in so many unimportant details of structure, and in so many mental peculiarities, that they can be accounted for only through inheritance from a common progenitor. (2) Wallace also affirms the original unity of man, and places him apart as not only the head and culminating point of the grand series of organic nature, but as, in some degree, a new and distinct order of being; maintaining that a superior intelligence has guided the development of man in a definite direction and for a special purpose, just as man guides the development of many animals and vegetable forms. (3) Carl Vogt holds a plurality of the race; adopts Darwin's idea of natural selection accounting for the origin and endowments of man, but rejects Wallace's idea of the highercontrolling intelligence. (4) Mivart propounds a theory of a natural evolution of man as to his body, combined with a supernatural creation as to his soul.

MAN, Isle of, an island in the Irish Sea, equidistant about 27 miles from England and Ireland, and 16 miles from Scotland; greatest length, n.e. to s.w., 33 miles, greatest breadth, e. to w., 12 miles; area, 145,325 acres. There is a small island, the Calf of Man (800 acres), at the s.w. extremity of Man. Lead and zinc are found in considerable quantities, especially the former. Fishing is an important industry, but the manufactures are almost entirely domestic. The island is governed by an independent legislature called the Tynwald, consisting of two branches—the governor and council and the house of keys. Two judges or “deemsters” try civil and criminal cases. The Manx language, a Celtic dialect, is still in use, although all the inhabitants speak English. The principal towns are Douglas, Castletown, Peel, and Ramsey. This island was taken by the Norwegians in 1098, sold to the Scots in 1266, and was repeatedly occupied by the English and Scots up till 1344, when it remained in possession of the former. It was latterly



Golden-winged manakin.

held as a feudal sovereignty by the earls of Derby, and more recently by the dukes of Athole, from whom it was purchased for the British crown. Pop. 54,758.

MAN'AKIN, the name given to the dentiostiral insessorial birds forming the sub-family Piprinae. They are generally small and of brilliant plumage and are mostly confined to South America, a few species being found in Central America and Mexico. The typical genus is *Pipra*, which includes the bearded manakin and several others. An allied species is the beautiful orange manakin or cock-of-the-rock.

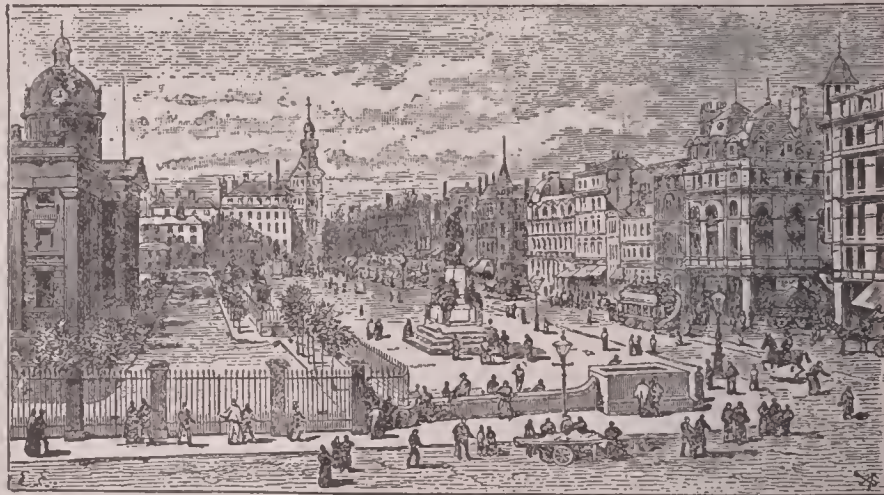
MANAS'SEH, (1) eldest son of Joseph, born in Egypt. His descendants formed a tribe, which, in the Promised Land, was settled half way east of the Jordan and half to the west of this river. (2) King of Judah, son of Hezekiah, whom he succeeded at twelve years of age, 697 B.C. He became an open idolater; was taken captive to Babylon; ultimately repented and was restored to his kingdom. He reigned for fifty-five years.

MANATEE', the sea-cow or lamantin, a gregarious aquatic mammal found on



The manatee.

the coasts of South America, Africa, and Australia. They generally frequent the mouths of rivers and estuaries, and feed on algæ and such littoral land vegetation as they can reach at high



Manchester—The Royal Infirmary and Piccadilly, from the Queen's Hotel.

tide. Their anterior limbs or swimming paws are furnished with nails, by means of which they drag themselves along the shore. They are large awkward animals, attaining a length of 8 to 10 feet as a rule, but sometimes growing to 20 feet. The skin is of a grayish color, sparsely covered with hairs. Their flesh is excellent, and they furnish a soft, clear oil, which does not become rancid. There are several species, the principal being the American manatee, which inhabits the shallow waters of the east coasts of South and North America, and the African manatee. The dugong belongs to the same order.

MANCHA, La, an ancient province of Spain, in New Castile, forming the chief

part of the modern province of Ciudad-Real; famous as the scene of Don Quixote's adventures.

MANCHE (mānsh), La, a department of Northern France, bounded on the w., n., and n.e. by the English Channel, and landward by the departments of Calvados, Orne, and Mayenne. It is about 80 miles long by 30 broad, and has an area of 2263 sq. miles. Principal towns, Saint-Lô, the chief town, Cherbourg, Avaranches, Coutances, and Granville. Pop. 491,372.

MAN'CHESTER, a mun., parl., and county borough and city of Lancashire, England, 188 miles n.n.w. from London by railway, and 32 miles east by north of Liverpool. Manchester charter of incorporation dates from 1838; in 1832 it was made a parliamentary borough, and in 1852 it became a city. Among the chief public buildings are the town hall or municipal buildings, behind them being a well-arranged prison; the Royal Exchange; the Royal Infirmary; the Free Trade Hall, used for public meetings; the Royal Institution, Salford town-hall, new general postoffice, city court-house, commercial buildings, etc. Among the churches the first place is due to the cathedral, a fine specimen of Perpendicular Gothic, built in 1422. The chief educational institution is Owens College, the nucleus of the Victoria University, founded in 1846. Cheetham's hospital was founded under the will of Humfrey Cheetham in 1653 for the education of poor boys. Attached to the institution is a library of nearly 40,000 vols., the first free library in Europe. The city

has also a number of denominational colleges. The grammar school was founded in 1520, and has exhibitions at Oxford or Cambridge. There are numerous literary, scientific, and philosophical societies, some of them of considerable standing. The free library, established in 1851, has a reference library in the main building of 100,000 vols., and six branches with upward of 120,000 vols. Among the public monuments the most noteworthy is the Albert Memorial in front of the town-hall. The chief manufacture is cotton, though woolen and silk fabrics are also produced. Metal manufactures, engineering, and the making of all kinds of machinery employ many hands. Rail-

way communication is of the most extensive kind, the largest stations being Victoria, London Road, Exchange, and Central. The commerce of the city has been further facilitated by the completion of the ship canal, connecting it with the Mersey estuary, an undertaking which altogether has cost \$75,000,000. It is 35½ miles long 26 feet deep, has several locks, and connected with it are docks at Manchester 100 acres in area. The manufacture of gas and supply of water are in the hands of the corporation, and an extensive scheme for bringing an improved water supply from Thirlmere in the Lake District has recently been completed at a cost of \$20,000,000. The introduction of machinery in cotton-spinning toward the end of the 18th century gave power and direction to the trade of modern Manchester, and its progress since has been extraordinarily rapid. A temporary check resulted from the civil war in America, which led to a cotton famine in 1862, causing the deepest distress in South Lancashire. Pop. of Manchester 543,930; of Salford, 421,015.

MANCHESTER, a town in New Hampshire, on the Merrimac, at the Amoskeag Falls, 59 miles north-north-west of Boston. It is one of the chief manufacturing places in New England, having the advantage of an unlimited supply of water-power from the falls of the Merrimac. The chief articles manufactured are cotton, woollens, fire-engines, locomotives, edge-tools, castings and paper. Pop. 1909, about 65,000.

MANCHESTER, a town in Chesterfield co., Va., on the James river, and the Richmond and Danville railroad; opposite Richmond. Pop. 11,500.

MANCHU'RIA, or **MANCHOORIA** (Chinese Shing-King) a Chinese territory occupying the northeastern corner of the empire, and abutting on Siberia and Corea, its chief natural boundaries being the Yellow Sea and Amur. It has been occupied since the troubles of 1900 by Russian troops, the promise of evacuation by Russia not having yet been carried out. The trans-Siberian railway crosses it. It is divided into three provinces, Shing-King, Feng-Tien, or Leao-tong in the south, of which Mukden is the capital; Kirin in the center, with a capital of the same name; and He-Lung-Kiang in the north, with capital Tsitsihar. The total area is about 380,000 sq. miles. The administration is military, the governors of the two northern provinces being subordinate to the governor of Mukden. The Manchus are a hardy race, and their country has long been the great recruiting ground for the Chinese army; but of late years vast numbers of Chinese proper have flocked into it, so that now they by far outnumber the native race. In the 17th century the Manchus invaded China and placed their leader's son upon the throne. Since that time the Manchu dynasty has continued to reign in China, and the Manchu language has become the court and official language. The country is mountainous, but on the whole fertile. The climate is good, for though the winters are severe they are healthy and bracing. The vast forests of the north are rich in useful timber of

all kinds. The principal food crops are pulse, millet, barley, and wheat. The vine, indigo, cotton, opium, tobacco, etc., are cultivated. The chief seaport is the treaty port Newchwang. In 1894 and 1895 Manchuria was the field of war between China and Japan and in 1900 the Boxer movement was most destructive, and in 1904 it became the theater of war between Russia and Japan. On February 9, Japan destroyed the Russian ships Variag and Korietz in the harbor of Chemulpo, and by a torpedo attack disabled some of the ships in Port Arthur. The Japanese having gained practical control of the sea landed their armies, and by their brilliant naval and land campaigns had destroyed Russia's supremacy in Asiatic waters, involved Port Arthur in a protracted siege and had driven the Russian army back on Mukden.

The persistent attempts of Admiral Togo to block Port Arthur, the blowing up of several Russian ships, the blowing up and ramming of Japanese ships, the destructive raids of the Vladivostok squadron on Japanese transports, the practical annihilation of the Vladivostok squadron were some of the more striking events of the war by sea. By land, the armies led by Gens. Kuroki, Oku, and Nodzu, notwithstanding desperate Russian resistance, were irresistible in their onward progress. May 1, Kuroki forced the passage of the Yalu. May 20 Oku stormed Kinchau and Nanschau Hill, driving Gen. Stoessel back on Port Arthur. June 14-16 Gen. Nodzu beleaguered Port Arthur while Oku and Kuroki defeated Gen. Stokelberg, who had been dispatched with 30,000 men to the relief of Port Arthur. The Japanese occupied Yinkow at the port of Newchwang, and on July 25 again defeated the Russians. One of the fiercest battles in history began on August 30 when after three days of the severest fighting Gen. Kuropatkin was compelled to abandon Liao-yang and retire on Mukden, the battle raging incessantly during the five days retreat.

On September 18, the Japanese began shelling the fortifications around Mukden. On October 4, Gen. Kuropatkin assumed the offensive, pushing his army across the Hun river. Here he was faced by Oku, Nodzu, and Kuroki. The battle of the Hun river lasting 11 days, and while the losses on both sides were enormous, the net result showed no gain to either side. During these months operations by land and sea before Port Arthur had been carried on with varying success. On December 2 the Japanese took 203 Meter Hill at a loss of 15,000 men, but it enabled them to mount their heaviest siege guns on a hill which commanded both the town and the harbor. On January 2, 1905, Gen. Stoessel was forced to surrender the entire garrison and the ships within the harbor.

With the fall of Port Arthur fighting was resumed at Mukden. By the middle of February Marshal Oyama had been reinforced by an army of 100,000 veterans under Gen. Nogi, the Japanese army now numbering 400,000 and the Russian 350,000. On February 20, a general advance was made against the

Russians. On March 10 Mukden was occupied by the Japanese and the Russian retreat turned into a rout.

On the capitulation of the Port Arthur garrison in January, the Japanese fleet under Togo was released from blockade duty and lay in wait for the Baltic fleet under Admiral Rojestvensky, and on May 27 surrounded the Russian fleet and pounded it to pieces.

The campaign on land and sea was again vigorously pushed, when, yielding to the earnest requests of President Roosevelt to stop the war if possible, both Russia and Japan consented in the latter part of June to hold a conference with peace a possible outcome. Baron J. Komura and Minister Takahira for Japan and Serge Witte and Baron Rosen for Russia were chosen as ambassadors with full powers to arrange terms of peace. The Portsmouth, N. H., navy-yard was selected as the meeting place. On August 29 the plenipotentiaries reached a final agreement, the treaty was drafted and signed on September 5. Peace was concluded September 5, 1905, by the intervention of President Roosevelt by the treaty of Portsmouth. Pop. estimated at 22,000,000.

MAN'DALAY, the capital of Burmah from 1860 to 1886, and now that of Upper Burmah, in a level plain about 2 miles from the left bank of the Irrawaddy, 386 miles by rail from Rangoon. Pop. 183,816.

MANDA'MUS, in law, a command or writ issuing from a superior court, directed to any person, corporation, or inferior court, requiring them to do some act therein specified which appertains to their office and duty, as to admit a person to an office or franchise, or to deliver papers, etc.

MAN'DARIN, the term applied by Europeans to government officials of every grade in China. The Chinese equivalent is kwan, which signifies literally a public character.

MANDARIN DUCK, a beautiful species of duck from Eastern Asia, the males of which exhibit a highly variegated plumage of green, purple, white, and



Mandarin duck.

chestnut, the females being colored a more sober brown. The male loses his fine plumage in summer.

MANDATS (mân-dâ), a kind of paper-money issued during the French revolution, differing from the assignats in so far as specific pieces of property, enumerated in a table, were pledged for the redemption of the bills, while the assignats furnished only a general claim.

MAN'DIBLE, the term more espe-

cially applied to both the upper and under jaws of birds. In mammals it is applied only to the under jaw, and in the Articulata to the upper or anterior pair of jaws, which are generally solid, horny, biting organs.

MAN'DOLIN, a musical instrument of the guitar kind. There are several varieties, each with different tunings. The Neapolitan has four strings tuned like those of the violin, G, D, A, E; The Milanese has five double strings (each pair in unison) tuned G, C, A, D,



Mandolin.

E. A plectrum is used in the right hand, the fingers of the left stopping the strings on the fretted finger-board.

MANDRILL, a species of baboon which is distinguished by the short or rudimentary tail, by the elongated dog-like muzzle, and by the presence of buttock callosities which are generally brightly colored. The mandrill inhabits Western Africa, where they associate in large troops. Full-grown males meas-



Mandrill.

ure about 5 feet; they are exceedingly strong and muscular, and fierce in disposition. It has cheek protuberances colored with stripes of brilliant red and blue.

MANFRED, king of the Two Sicilies; born 1231, died 1266. A natural son of the Emperor Frederick III., he was regent in Italy first for his brother and then for his nephew, on whose rumored death he was crowned king. He refused to resign in favor of his nephew, was excommunicated, and his kingdom of the Sicilies given as a papal fief to Charles of Anjou. The latter marched into Naples and gained a victory, in which Manfred was killed.

MAN'GANESE, a metal of a dusky-white or whitish-gray color, very hard and difficult to fuse. Exposed to air it speedily oxidizes; it decomposes water with evolution of hydrogen. The common ore of manganese is the dioxide, black oxide, or peroxide, a substance largely employed in the preparation of bleaching-powder or chlorate of lime. It is employed in the manufacture of plate

glass, to correct the yellow color which oxide of iron is apt to impart to the glass. It is also used in making the black enamel of pottery. Other oxides are the protoxide, sesqui-oxide, the red oxide, and permanganic acid. The latter is only known in solution or in a state of combination. It is largely used in analytical chemistry. Metallic manganese is obtained by reduction of the oxide by means of heat and finely-divided carbon. It resembles iron in appearance and properties; is a constituent of many mineral waters, and is employed in medicine. In steel manufacture it is used in certain proportions with advantage as regards the ductility of the steel and ability to withstand forging, and in other manufacturing operations it forms an important element.

MANGANESE BRONZE, a kind of bronze in which the copper forming the base of the alloy is mixed with a certain proportion of ferro-manganese, and which has exceptional qualities in the way of strength, hardness, toughness, etc. Various qualities are manufactured, each suited for certain special purposes. One quality, in which the zinc alloyed with the treated copper is considerably in excess of the tin, is made into rods, plates, etc., and when simply cast is said to have a tensile strength of about 24 tons per square inch, with an elastic limit of from 14 to 15 tons. Another quality used in gun-founding has all the characteristics of forged steel without any of its defects. A third quality is now in extensive use for toothed-wheels, gearing, brackets, and all kinds of machinery supports. From its non-liability to corrosion it is largely employed in the manufacture of propellers.

MANGE, a cutaneous disease to which dogs, horses, cattle, etc., are liable. It resembles in some measure the itch in the human subject, ordinary mange being due to the presence of a burrowing parasite. Both local application and internal remedies are used in its cure.

MANGO, the fruit of the mango-tree, a native of tropical Asia, but not widely cultivated throughout the tropics. Fine varieties produce a luscious, slightly acid fruit much prized for dessert. The large flat kernel of the fruit is nutritious, and has been cooked for food in times of scarcity. The fruit forms a fleshy drupe about the size of a hen's egg or larger, somewhat kidney-shaped and yellowish or reddish in color, spotted with black on the outside. The fruit is much used for making pickles, chutneys, and curries. Dried, it forms a considerable article of commerce. It yields by distillation a spirit said to be not unlike whisky in flavor. The tree grows to a considerable size, with an erect trunk, and yields a timber that is used for a variety of purposes for which fine timber is not required, as for packing-boxes, country carts, rough furniture, house carpentry, etc.

MANGOSTEEN, a tree of the East Indies. The tree grows to the height of 18 feet, and the fruit is about the size of an orange, and contains a juicy white pulp of a delicate, sweet, sub-acid flavor. It is esteemed one of the most delicious and wholesome of all known fruits. The thick fleshy rind has astringent prop-

erties, and hence is used medicinally in diarrhoea and dysentery.

MANGROVE, a genus of plants consisting of trees or shrubs which grow in tropical countries along the muddy beaches of low coasts, where they form impenetrable barriers for long distances. They throw out numerous roots from the lower part of the stem, and also send down long slender roots from the branches, like the Indian banyan-tree. The seeds germinate in the seed vessel, the root growing downward till it fixes itself in the mud. By retaining mud and vegetable matter among their roots mangroves often help in the gaining of land from the sea. The wood is dark-red, hard, and durable, and the bark is used for tanning. The fruit is said to be sweet and edible, and the fermented juice is made into a kind of light wine. The name is also given to the verbenace family, which occupies large tracts of shore in tropical countries, extending as far south as New Zealand and Tasmania.

MANHATTAN ISLAND, an island at the head of New York bay, forming the borough of Manhattan in New York City, and containing the commercial and financial nucleus of the metropolis, together with its main residence portion. It is situated between the Hudson or North river and the East river: Spuyten Duyvil creek and the Harlem river separate it from the mainland on the north and northeast. The island, with tapering northern and southern extremities, a few hundred yards wide, is 13½ miles long, with a maximum width, at Fourteenth street, of 2½ miles, and an area of 22 sq. miles. It has a wharfage front of 22 miles, with a depth of water sufficient for the largest vessels. Three bridges connect Manhattan Island with Long Island. A number of bridges span the Harlem river and Spuyten Duyvil creek, and numerous steam ferries communicate with the adjacent shores. The surface is undulating and rocky, in the north rising from the Hudson to an altitude of 238 feet at Washington Heights, but sloping abruptly toward the east, where is a level stretch formerly known as the Harlem Flats. The greater part of the city is built on the rock foundation; pile foundations, however, are resorted to in the deeper glacial deposits and in the beach sand.

MANIA. See Insanity.

MAN'IFEST, is a document signed by the master of a vessel at the place of lading, to be exhibited at the custom-house, containing a specific description of the ship and her cargo, with the destination of the ship and of each package of the goods, etc.

MANILA, or **MANIL'LA**, the capital city of the island of Luzon and of all the Philippine islands, see of the Roman Catholic primate, and residence of the United States governor, lies on the bay of the same name, and at the mouth of the river Pasig. It consists of an old fortified city with extensive suburbs, in which are the mass of the population, and the business premises, factories, and residences of the European inhabitants. Manila is the center of commerce of the Philippines, and exports sugar, tobacco, cigars and cheroots, indigo,

Manila hemp, coffee, mats, hides, trepang, rice, etc. It imports British and United States cloths, hardware, etc., and a great variety of articles, tea, pottery, etc., from China. The manufactures consist chiefly of cigars and cheroots, and hemp and cotton fabrics. Manila



was founded by the Spaniards in 1571. It has frequently suffered from earthquakes. It has electric lighting and a good water-supply, and is rapidly improving under American rule, especially in sanitation. Pop. 275,000.

MANILLA, or MANILA HEMP. See Abaca.

MANIPUR (-pör'), a native state of Northeastern India, area, 8000 sq. miles; pop. 283,957; capital, Imphal.

MANISTEE, a town in Michigan, on Lake Michigan, at the mouth of the Manistee. It is in the great fruit belt region. It has the largest vacuum evaporating salt plant in the world. Pop. 17,362.

MAN'ITO, Man'itou, among certain of the North American Indians, a name given to whatever is an object of religious awe or reverence, whether a good or evil spirit or a fetish. Two manitos or spirits are spoken of by pre-eminence, the one the spirit of good, the other the spirit of evil.

MANITO'BA, a province of the Dominion of Canada, is bounded on the north by Saskatchewan and Kewatin, on the east by the states of Minnesota and North Dakota, and on the west by Assiniboia, and Saskatchewan. It occupies a position nearly in the center of the North American continent, and extends from 49° to 52° 50' n. lat.; and from 89° to 101° 20' w. lon.; area, estimated at 64,000 sq. miles. The climate is warm in summer, but very cold in winter. The summer mean is about 66°, but in winter the thermometer sinks to 30°, 40°, and sometimes 50° below zero, though this severe cold is mitigated by a clear dry atmosphere. The summer months are part of May, June, July, August, and September. The principal rivers are the Assiniboine and the Red river, the latter having the greater part of its course in the United States. The largest lakes are Winnipeg, Winnipegosis, and Manitoba, the two former being only partially included within the boundaries of the province. The greater part of the province consists of level treeless prairie land, covered with a

rich vegetable growth in summer. The banks of the streams, however, are lined with a timber belt extending from about half a mile to ten miles back. The soil is generally a rich black mould, resting partly on a limestone formation, and partly on a thick coat of hard clay. Wheat, oats, barley, Indian corn, hops, flax, hemp, and all kinds of garden vegetables produce excellent crops. For wheat growing Manitoba presents peculiar advantages. Potatoes and all other root-crops thrive well, and the prairie grasses furnish good hay. Game is abundant, and the rivers and lakes teem with fish. Manitoba is divided into seven electoral districts for Dominion elections, each sending one member to the house of commons. The province likewise sends four members to the senate of the Dominion. The public affairs are administered by a lieutenant-governor, an executive council of five members, and a legislative assembly of forty members elected for four years. The school system established by law is now undenominational, and is supported by local assessments, supplemented by legislative grants. The capital of the province is Winnipeg, situated at the junction of the Assiniboine and Red rivers; other towns are Portage la Prairie, Brandon, Selkirk, and Emerson. The nucleus of Manitoba was the Red river settlement established in 1812, but little progress was made till the territory became part of Canada in 1870. The trade of the province has been greatly increased since 1878, when Winnipeg was connected with the railway system of the United States; and the construction of the Canadian Pacific railway, which crosses the province from east to west, has added materially to its progress and prosperity. Pop. 294,947.

MANITOBA LAKE, a lake of Canada, province of Manitoba, 30 or 40 miles s.w. of Lake Winnipeg, about 120 miles in length by about 25 miles in breadth; area, 1900 sq. miles. It receives the waters of several lakes at its northern extremity, and at its southern White Mud river. It discharges into Lake Winnipeg through the Dauphin river.

MANITOU. See Manito.

MANITOU'LIN ISLANDS, a group of North American islands in Lake Huron, consisting of Grand Manitoulin, 80 miles long by 5 to 30 broad, Little Manitoulin, and Drummond island. The two former belong to Canada, the latter to the United States (Michigan). Pop. about 2000, more than one-half being Indians.

MANITOWOC, the county-seat of Manitowoc co., Wisconsin, on Lake Michigan, at the mouth of a river of the same name. It has a good harbor and considerable trade. Pop. 13,640.

MANKA'TO, a town in Minnesota, 70 miles s.w. of St. Paul. It is a thriving center of a large agricultural district; has various manufactures and a good trade. Pop. 12,615.

MANNA, the sweet concrete juice which is obtained by incisions made in the stem of a species of ash, a native of Sicily, Calabria, and other parts of the south of Europe. The manna of commerce is collected in Sicily, where the

manna-ash is cultivated for the purpose in regular plantations. The best manna is in oblong pieces or flakes of a whitish or pale-yellow color, light, friable, and somewhat transparent. It has a slight peculiar odor, and a sweetish taste mixed with a slight degree of bitterness, and is employed as a gentle laxative for children or persons of weak habit. It is, however, generally used as an adjunct to other more active medicines. In Scripture we are told that a substance called manna was miraculously furnished as food for the Israelites in their journey through the Arabian wilderness.

MANNA-ASH. See Manna.

MANNHEIM, (mán'him) a town of Germany, grand-duchy of Baden, on the right bank of the Rhine, near the confluence of that river with the Neckar. The principal buildings are the Schloss or castle, the theater, arsenal, Jesuits' church, etc. The town has suffered severely from war, especially in the siege of 1795. Pop. 140,384.

MANNING, Daniel, American journalist and politician, was born in Albany, N. Y., in 1831. In 1876 he became a member of the New York Democratic State Committee, was chosen secretary in 1879 and chairman in 1881. In 1882 he contributed greatly to the election of Grover Cleveland as governor of New York and it was Manning's astuteness and tact that made possible the successful presentation of Cleveland's name as a candidate for the presidency in 1884. In the latter year his personal supervision contributed greatly to the success of the democratic ticket in the pivotal state of New York. From 1885 to 1887 he was secretary of the treasury in Cleveland's cabinet, from which he retired on account of ill health shortly before his death in 1887.

MANNING, Henry Edward, Cardinal, born at Totteridge, Hertfordshire, 1808. He took an active part in the Tractarian movement, and in 1851 joined the Church of Rome, and was ordained priest. On the death of Cardinal Wiseman he succeeded him as Archbishop of Westminster (1865), and ten years after he was made cardinal. He died in 1892.

MANŒUVRES, the movements and evolutions of any large body of troops or fleet of ships, for the purpose of testing the efficiency of the various bodies of the service under the conditions of actual warfare, and for the purpose of instructing officers in tactics, and officers and men in their various duties. For these purposes mimic warfare is carried on periodically under the name of military or naval manœuvres.

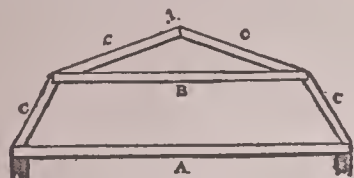
MAN-OF-WAR BIRD. See Albatross.

MANOM'ETER, an instrument to measure or show the alterations in the rarity or density of the air, or to measure the rarity of any gas. Such instruments as measure the elastic force of steam are also properly termed manometers. They are variously constructed.

MANS, LE (lé mǎn), a town of France, capital of department Sarthe, on a height above the Sarthe, 115 miles southwest of Paris. Pop. 62,948.

MANSARD (mán-sār), François, French architect, born in Paris 1598, died 1666. The roof known by his name

was his invention. His nephew, Jules Hardouin, who assumed his name (1645-1708), attained great fame as an architect. The Palais de Versailles, Hôtel des



Mansard roof.
A, Tie-beam. B, Collar-beam. CC, Rafters.

Invalides, the Place Vendôme, and other works of the reign of Louis XIV., were from his designs.

MANSARD ROOF, a roof formed with an upper and under set of rafters on each side, the under set approaching more nearly to the perpendicular than the upper.

MANSFIELD, the capital of Richland co., O., on the Balt. and O., the Erie, the Penn., and the Pitts., Cin., Chi. and St. L. railways; 180 miles n. e. of Cincinnati. It is in an agricultural region; has manufactories of agricultural implements, flour, stoves, pumps, and numerous minor articles. Pop. 21,625.

MANSFIELD, Richard, American actor was born in the island of Heligoland in 1857. When about seventeen years of age he came to the United States. His first appearance on the stage was as Baron Chevrial in *A Parisian Romance*, and was a great success. Among his parts have been Doctor Jekyll and Mr. Hyde, Richard III., Beau Brummell, Cyrano de Bergerac, Monsieur Beaucaire and Brutus. He died in 1907.

MANSLAUGHTER. See Homicide.

MANTCHOOS. See Manchuria.

MANTELL, Gideon Algernon, geologist and palæontologist, born at Lewes, in Sussex, 1790, died in London 1852. Through his investigations the fossilized skeletons of those gigantic reptiles the *Iguanodon* and *Hylæosaurus* were discovered. He was a popular lecturer on geology, and published *The Fossils of the South Downs*, *Illustrations of the Geology of Sussex*, *Wonders of Geology*, and *Medals of Creation*.

MANTEUFFEL (mán'toi-fl), Edwin, Baron von, German field-marshal, born 1809, died 1885. He played a distinguished part in the Franco-German war, especially in several actions around Metz at Amiens, and in driving Bourbaki's army across the frontier into Switzerland. From June, 1871, to July, 1873, he commanded the army of occupation in France, and was made field-marshal. In 1879 he was appointed governor-general of Alsace-Lorraine.

MANTIS, a genus of orthopterous insects, remarkable for their grotesque forms. They frequent trees and plants,



Praying-mantis.

and the forms and colors of their bodies and wings are so like the leaves and twigs which surround them as to give them remarkable power to elude obser-

vation. The praying-mantis has received its name from the peculiar position of the anterior pair of legs, resembling that of a person's hands at prayer. In their habits they are very voracious, killing insects and cutting them to pieces. They are natives chiefly of tropical regions, but are also found in France, Spain, and the warmer parts of Europe. They are very pugnacious, and are kept by the Chinese for the purpose of watching them fight.

MAN'TUA, a strongly fortified town of Northern Italy, one of four forming the Quadrilateral, capital of the province of the same name, 80 miles e. s. e. of Milan. Virgil was born at the adjoining village of Andes, supposed to be the modern Pietole. Pop. 28,048.—The province, which is intersected by the Po, Mincio, and other streams, produces rice, wheat, silk, wine, etc.; area, 961 sq. miles; pop. 315,314.

MAN'U, an early Sanskrit writer, author of a book of laws, civil and religious, called *Dharma-Shastra*, still extant.

MANUAL ALPHABET. See deaf and Dumb.

MANUAL OF ARMS, a text-book of rules and explanations for the instruction of military recruits in the use of their arms and their care and preservation. In the United States Army all drills begin and end with an examination of cartridge chambers, and for purposes of instruction the movements are divided into motions, and executed in detail. The command of execution determines the prompt execution of the first motion, and the commands Two, Three, etc., the other motions. The commands and movements of the manual of arms are given after the soldier is in position with rifle at the order, and are as follows: (1) Order arms; (2) carry arms; (3) present arms; (4) right shoulder arms; (5) port arms. Other movements are: (6) Parade-rest; (7) fix bayonets; (8) charge bayonets.

MANUMISSION, among the Romans, the solemn ceremony by which a slave was emancipated.

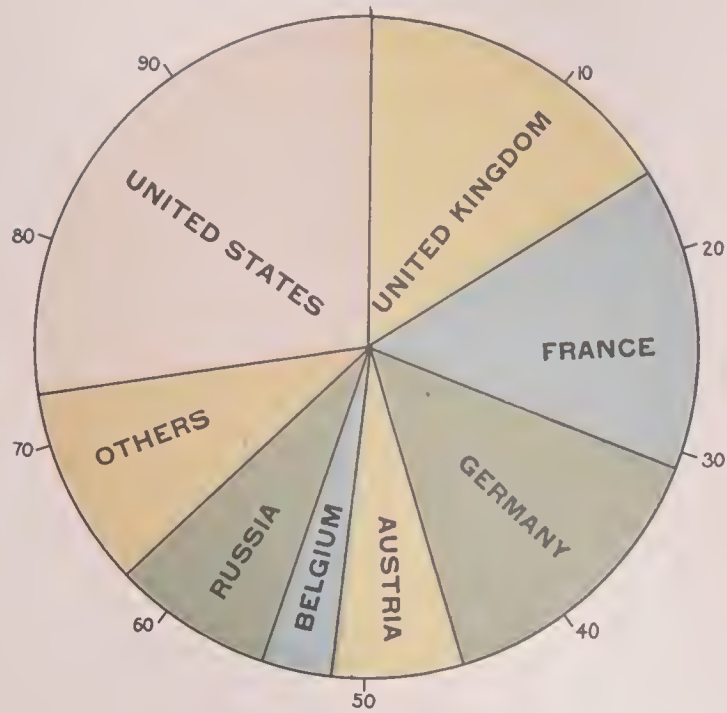
MANURES, vegetable, animal, and mineral matters introduced into the soil to accelerate vegetation and increase the production of crops; substances used to improve the natural soil, or to restore to it the fertility which is diminished by the crops annually carried away. Animal substances employed as manures comprehend the putrefying carcasses of animals, ground bones, blood, the excrements of animals, as the dung of horses, cattle, sheep, poultry, etc.; urine, guano (the decomposed excrement of aquatic birds); the scrapings of leather, horn, and the refuse of the shambles; the hair or wool of animals. Liquid manure, consisting of town sewage, the drainings of dung-heaps, stables, and cow-houses, is largely employed in many districts. Almost every kind of vegetable substance, in one state or another, is used as manure. The principal mineral substances employed as manures are lime, chalk, sand, clay, marl; sulphates of potash, soda, ammonia, and magnesia; nitrates of potash and soda; and phosphates of lime. It is from containing one or other of these substances that apatite,

basic slag, cubic nitre, kainite, etc., are so valuable. Modern researches upon plant nutrition, and the chemistry of agriculture in general, have shown us that the food of plants may be classed under the two headings of air food and mineral food. Air food consists of ammonia, water, and carbon dioxide; mineral food, of those substances which remain as ash when the plant is ignited. The former class of food is supplied to the plant partly from the atmosphere and partly from the soil, the latter from the soil entirely. In the production of food by natural processes of plant-growth a certain amount of air food and also of mineral food is abstracted from the soil, those amounts varying for different species of plants; if this food be returned to the soil, then a further growth of plants may be expected; if, however, seed is sown in the partially impoverished soil, there must be a decrease in the amount of crop obtained from that soil. As the plants serve to nourish animals, it follows that the substances which have been withdrawn from the soil by the plants may be returned to it in the shape partly of animal excreta, and partly of ground bones, etc. Different plants require different kinds of food; if, therefore, the kind of crop grown on the same land be varied from year to year, and if the soil be tilled so as to unlock its natural supplies of mineral food, it will be found that the average yield of crops may be maintained simply by the restitution to the land of that amount of food which has been removed from it by the plants.

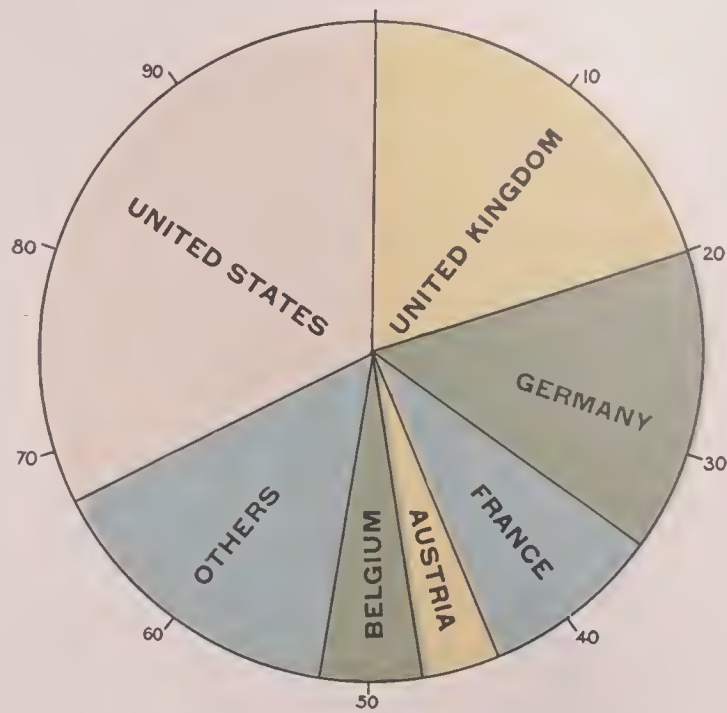
MANUSCRIPTS, are literally writings of any kind, whether on paper or any other material, in contradistinction to printed matter. Previous to the introduction of printing all literature was contained in manuscripts, and the deciphering and proper use of these form an important part in the science of palæography. All the existing ancient manuscripts are written on parchment or on paper. The paper is sometimes Egyptian (prepared from the real papyrus shrub), sometimes cotton or silk paper. The most common ink is the black, which is very old. Red ink of a dazzling beauty is also found in ancient times in manuscripts. With it were written the initial letters, the first lines, and the titles, which were thence called rubrics. Blue, green, and yellow inks were more rarely used. On rare occasions gold and silver were the mediums, though from their cost they are oftenest confined to initial letters. With respect to external form, manuscripts are divided into rolls, and into stitched books or volumes (properly codices). The most ancient manuscripts still preserved are those written on papyrus which have been found in Egyptian tombs. Several of these are of date considerably before the Christian era: notably fragments of the *Iliad* and a papyrus containing the orations of Lycophron and Euxenippus, 11 feet in length and containing 49 columns of writing. Next to them in point of age are the Latin manuscripts found at Herculaneum. It was a common custom in the middle ages to obliterate and erase writings on

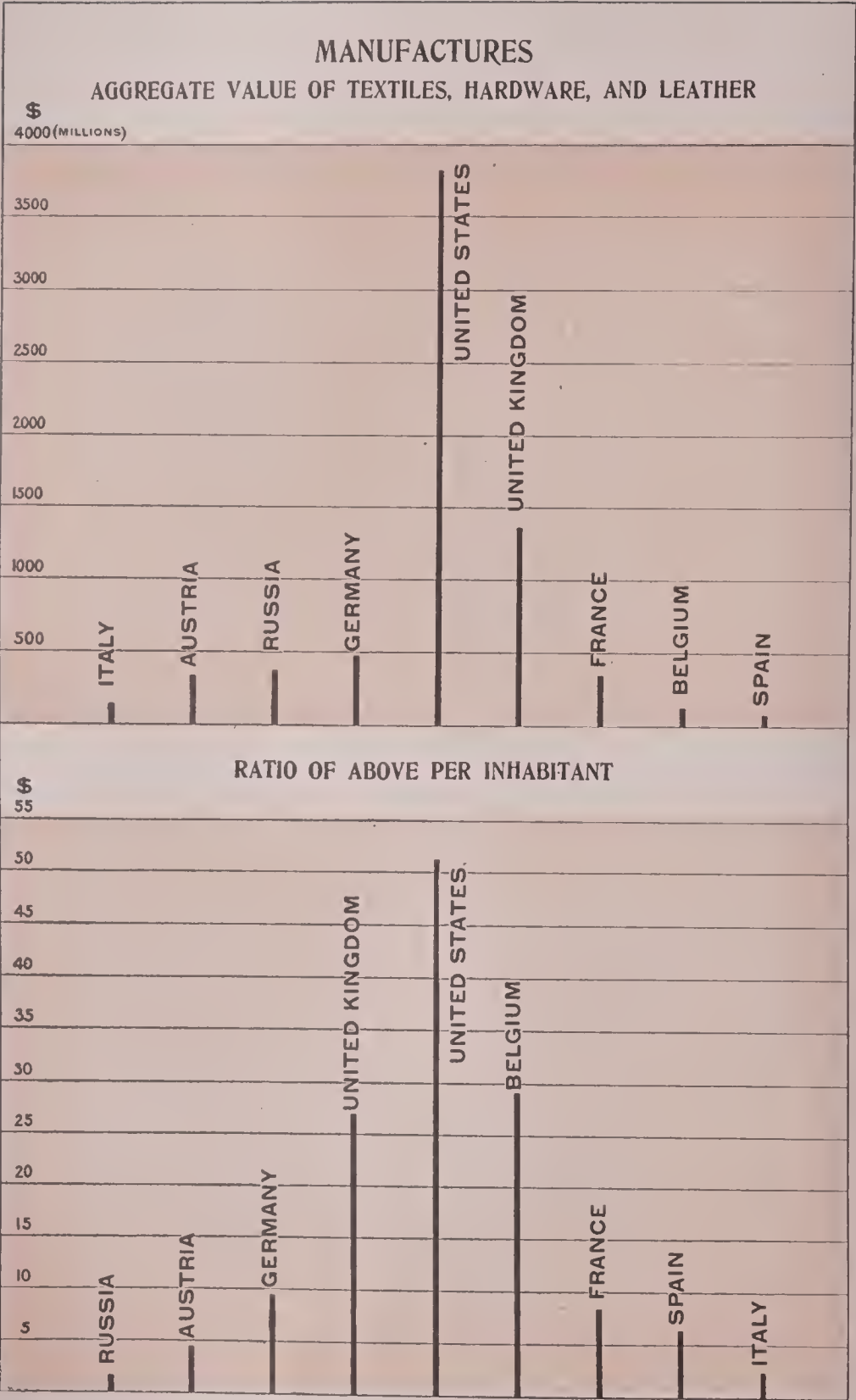
MANUFACTURES

TEXTILE VALUE



HARDWARE VALUE





parchment, for the purpose of writing on the materials anew, manuscripts thus treated being called palimpsests.

The art of illuminating manuscripts dates from the remotest antiquity. The Egyptian papyri were ornamented with vignettes or miniatures attached to the chapters, either designed in black outlines or painted in primary colors in distemper. The oldest ornamented Greek and Roman manuscripts that have survived are the Diosorides of Vienna and the Virgil of the Vatican, both of the 4th century, and having vignettes or pictures in a Byzantine style of art. From the 8th to the 11th century the initial letters in use were composed of figures of men, quadrupeds, fishes, birds, etc.

MANU'TIUS, Aldus, or Aldo Manuzio, Italian printer, born about 1447, died 1515. In 1488 he established himself as a printer at Venice, but the first work which he finished was not published till 1494. In the course of the ensuing twenty years he printed the works of the most ancient Latin and Greek authors extant, as well as many productions of his contemporaries, and some treatises of his own composition. He was the inventor of the italic or cursive character, hence called Aldine.

MANZO'NI, Alessandro, an Italian poet and novelist, was born 1784, died 1873. He was the son of Count Pietro Manzoni and of the Marchioness Giulia Beccaria, daughter of the Marquis Cesare Beccaria, author of the well-known treatise on Crimes and their Punishment. After his father's death in 1805 he lived for some time in Paris with his mother, and in 1808 he married the daughter of a Genoese banker, under whose influence he settled down into the fervent Catholicism which colored all the rest of his life. His chief works are the *Inni Sacri*, a series of sacred lyrics; *Il Cinque Maggio*, a powerful ode on the death of Napoleon; the tragedies *Il Conte di Carmagnola*, and *Adelchi*; and his great novel *I Promessi Sposi* (The Betrothed).

MAORIS (mā'o-riz), the name given to themselves by the natives of New Zealand.

MAP, a projection on a plane surface of the whole or a part of the earth's surface, showing its main features in more or less detail. The earth being a spheroid, its surface cannot be made to coincide rigorously with a plane; and it therefore becomes necessary to have recourse to a projection, that is, a plan on a plane surface, which indicates with sufficient correctness the relative positions, dimensions, etc., of the different parts of the spherical surface. There are five principal projections, the orthographic, the stereographic, the globular, the conical, and the cylindrical or Mercator's distinguished from each other by the different positions of the point of projection, or that in which the eye is supposed to be placed. The last named gives a very erroneous idea of the relative size of the different portions of the earth's surface, especially toward the poles, but is very useful to mariners, in enabling them to lay off a course that can be steered by compass in straight lines. (See *Mercator's Projection*.) A nautical map is usually called a chart (which see).

MAPLE, a name for trees, peculiar to the northern and temperate parts of the globe. About fifty species are known, distributed through Europe, North America, and different parts of Asia. They are small or large trees, with a sweetish, rarely milky, sap, opposite deciduous, simple, usually lobed leaves, and axillary and terminal racemes or corymbs of small greenish flowers. The characteristic form of the fruit is shown in the figure. The wood is valuable for various purposes, as for carving, turnery, musical instruments, wooden dishes, etc. Another well-known species is the Norway maple. The wood of several American species is also applied to various uses. The sugar or rock maple is the most important species; this yields maple-sugar, which in many parts of the United States is an important article of manufacture. A tree of ordinary size will yield from 15 to 30 gallons of sap yearly, from which are made from 2 to 4 lbs. of



Sugar maple.

sugar. The knotted parts of the sugar-maple furnish the pretty bird's-eye maple of cabinet-makers. Some other American species are the white maple, the red or swamp maple, the striped maple or moose wood, the mountain maple, the vine maple, and the large-leaved maple.

MAQUI (mak'wē), an evergreen or subevergreen shrub found in Chile, from the juice of whose fruit the Chilians make a kind of wine.

MARASCHINO (ma-ras-kē'nō), a fine liquor distilled from a small black wild variety of cherry. The best-known kinds are the maraschino de Zara, from Zara in Dalmatia, and that from Corsica. An inferior kind is made in Germany.

MARAS'MUS, a wasting of the flesh without fever or apparent disease; often, however, dependent on disease of the mesenteric glands, or some obstruction in the course of the chyle.

MARAT (mā-rā), Jean Paul, one of the most infamous leaders of the French revolution, born near Neufchâtel in 1744. The first breath of the revolution, brought him to the front, and when Danton instituted the club of the Cordeliers, Marat became the editor of the *Publiciste Parisien*, better known under its later title *L'Amidu Peuple*, which was again changed to the *Journal de la République Française*, a journal which was the organ of that society, and soon became the oracle of the mob. His paper was issued from various places of concealment until the 10th August, 1792, after which he took his seat at the commune, and

played a leading part in the assassinations of September (1792). He was a member of the terrible committee of public safety, and of the convention



Jean Paul Marat.

where General Dumouriez and the Girondists, who endeavored at first to prevent his taking his seat, were the special objects of his attack. The establishment of the revolutionary tribunal, and of the committee for arresting the suspected, was adopted on his motions. On the approach of May 31, as president of the Jacobin Club he signed an address instigating the people to an insurrection, and to massacre all traitors. For this Marat was delivered over to the revolutionary tribunal, which acquitted him; and the people received him in triumph and covered him with wreaths. He was assassinated shortly after by Charlotte Corday, July 13, 1793. His remains were deposited in the Pantheon with national honors, but were subsequently removed.

MAR'ATHON, a village of ancient Greece, in Attica, about 20 miles northeast of Athens. It was situated (probably on the site of the modern Vrana) on a plain which extends for about 6 miles along the seashore, with a breadth of from 1½ to 3 miles. It is famous for the overthrow of the Persians by the Athenians under Miltiades, 490 B.C.

MARAT'TI, Carlo, Italian painter and engraver, born in 1625. Louis XIV. employed him to paint his celebrated picture of Daphne. Clement IX., whose portrait he painted, appointed him overseer of the Vatican gallery. He has been styled the last painter of the Roman school. His Madonnas were particularly admired. He died in 1713 at Rome, where his chief works are to be found.

MARBLE, the name given to certain varieties of limestone capable of receiving a brilliant polish, and which, both from their durability and the beauty of the tints of many of them, have at all periods of the world been greatly in request for purposes of art or ornament. White statuary marble is a pure carbonate of calcium. Marbles have been divided into seven varieties or classes.

MARBLING, in bookbinding, a process of ornamenting the edges of books by dipping them, when cut, in a trough about 2 inches deep and filled with gum-water on the surface of which colored pigments have been thrown and disposed in various forms with a quill and comb.

The colors adhering to the edge of the book are set by dashing cold water over them. Marbled papers for the sides of books are made in the same manner.

MAR'CASITE, iron pyrites or bisulphide of iron. It is of a paler color than ordinary pyrites, being nearly of the color of tin, and its luster is more strongly metallic.

MARCELLUS, Marcus Claudius, a Roman general, five times consul (222, 215, 214, 210, and 208 B.C.); the first Roman who successfully encountered Hannibal in the second Punic war; and the conqueror of Syracuse (212 B.C.). He was killed in a skirmish with the Carthaginians in 208 B.C.

MARCH, originally the first month of the Roman year. Till the adoption of the new style in Britain (1752), the 25th of March was the first day of the legal year; hence January, February, and the first twenty-four days of March have frequently two years appended, as January 1, 170½, or 1701-2.

MARCO POLO. See Polo.

MARCONI, Guglielmo, Italian electrician was born near Bologna at Grifone in 1875. At the university of Bologna he became interested in the nature of the Hertzian waves, and saw the possibilities of using these waves for the transmission of messages. He made several successful experiments in 1895 and 1896. In 1897 The Marconi Wireless Telegraph Company was started with large capital. In 1899 signals were successfully exchanged across the English



Guglielmo Marconi.

channel. In 1901 from St. John, N. F., Marconi sent a signal to the Irish coast and on December 9, 1902, succeeded in sending a message. In February, 1902, on his way to the United States, Marconi received signals on board ship at a distance of 2099 miles. In January, 1903, Marconi sent a message from President Roosevelt to King Edward from Cape Cod, Mass., direct to Poldhu a distance of 3000 miles. See Wireless Telegraphy.

MARCUS AURELIUS. See Aurelius Antoninus.

MARCY, William Learned, American politician, was born at Sturbridge, Mass., in 1786. He soon became a leading democratic politician, and one of the "Albany regency" which was supposed to control the action of the party in

New York State. He was United States senator in 1831-32, and during his term he incidentally made use of the phrase so frequently afterward heard, "To the victors belong the spoils." He resigned to become governor of New York, 1833-39. He was secretary of war under Polk, 1845-49, and secretary of state under Pierce, 1853-57. As secretary of state he conducted with success the Koszta case in 1854, involving a collision with Austria on the subject of the right of expatriation. All his political leanings were to that branch of the democratic party in New York which made the strength of the new republican party in 1856, and he would have been its natural leader if he had followed his own convictions on the Kansas-Nebraska bill. He hesitated, and other men took his place. He died at Ballston Spa, N.Y., July 4, 1857.

MARGARET, Queen of Denmark, Norway, and Sweden, called the Northern Semiramis, the daughter of Waldeemar III., king of Denmark; born at Copenhagen in 1353, married to Hakon, king of Norway, in 1363. The death of her husband in 1380 placed Norway in her hands; that of her son Olaf in 1387 enabled her to secure the throne of Denmark, to which she had previously brought about his election; and after defeating Albert, the Swedish king, she also obtained possession of the throne of Sweden. She endeavored to place the union of the three kingdoms on a permanent basis by the celebrated Act of Union, or Treaty of Calmar (1397). She died in 1412, after having raised herself to a degree of power then unequalled in Europe from the time of Charlemagne.

MARGARET OF ANJOU, daughter of René, titular king of Sicily, was born at Pont-à-Mousson, in Lorraine, in 1425, and married in 1443 to Henry VI. of England. The imbecility of the king made her practically regent, and her power being contested by the Duke of York, a claimant of the throne by an elder line, the protracted wars of the roses commenced. At first victorious she was afterward compelled to flee to Scotland, but raising an army in the north, she secured, by the battles of Wakefield (1460) and St. Albans (1461), the death of York and the release of the king. Her army, however, was soon afterward annihilated at Towton (1461) and Edward (IV.), the son of the late Duke of York, was declared king. She succeeded in obtaining assistance from Louis XI. of France, but was once more defeated, and took refuge in France. Warwick then became embroiled with the young king, and determined to replace Henry on the throne. Edward was in turn obliged to escape to the continent but obtaining assistance from the Duke of Burgundy, returned and defeated Warwick at Barnet (1471). Margaret, collecting her partisans, fought the battle of Tewkesbury (1471), but was totally defeated. She and her son were made prisoners, and the latter, when led into the presence of the royal victor, was killed. Henry soon after died or was murdered in the Tower, and Margaret remained in prison four years. Louis XI. ransomed her for 50,000 crowns, and in 1482 she died.

MARGARET OF VALOIS, Queen of Navarre, sister to Francis I. of France, was born at Angoulême in 1492. She was brought up at the court of Louis XII., and married the Duke of Alençon in 1509, became a widow in 1525, and in 1527 was espoused to Henry d'Albret, count of Béarn and titular king of Navarre. From this time she resided at Béarn, assisting in the development of the resources of the small kingdom, and making it a center of liberal influence. Many Protestants took refuge in her territories; and her name is closely linked with those of Rabelais, Dolet, Marot, and the leading men of the period. She herself possessed no ordinary culture, being credited with a knowledge of six languages and the authorship of several works, of which the chief were *Le Miroir de l'Âme Pécheresse*, printed in 1533 and condemned by the Sorbonne for its Protestant tendencies; the *Heptaméron*, a collection of Tales in imitation of the *Decamerone* of Boccaccio, and first printed in 1559; and a collection of poems published in 1547 under the title of *Marguerites de la Marguerite des Princesses*. She died in 1549, leaving one child, Jeanne d'Albret, afterwards mother of Henry IV.

MAR'GARINE, a mixture of stearine and palmitine, obtained from beef fat, lard, etc., and formerly regarded as a simple fat. The name is now applied to an imitation of butter. See Butterine.

MAR'GRAVE, originally a commander intrusted with the protection of a mark, or country on the frontier. The margraves acquired the rank of princes, and stood between counts and dukes in the German Empire.

MARIA LOUISA, second wife of Napoleon I.; born in 1791; eldest daughter of the Emperor Francis I. of Austria. Her marriage with Napoleon took place in 1810 after the divorce of Josephine, and in 1811 she bore him a son. After his overthrow she received in 1816 the duchies of Parma, Piacenza, and Guastalla, which she governed till her death in 1847. At Napoleon's death she made a morganatic marriage with her chamberlain, Count Neipperg.

MARIANA (or Marianne) **ISLES**. See Ladrões.

MARIA THERESA, Queen of Hungary and Bohemia, Arch-duchess of Austria, and Empress of Germany, daughter of the Emperor Charles VI., was born at Vienna 1717, and in 1736 married Francis Stephen, grand-duke of Tuscany. On the death of her father in 1740 she ascended the throne of Hungary, Bohemia, and Austria, and a little later declared her husband joint ruler. Her accession was in accordance with the Pragmatic Sanction, but her claims were at once contested. Frederick the Great made himself master of Silesia; Spain and Naples gained possession of the Austrian territory in Italy; and the French, Bavarians, and Saxons marched into Bohemia, carrying all before them. Charles Albert was proclaimed Arch-duke of Austria, and shortly after Emperor of Germany; and the young queen fled to Presburg, where she convoked the diet and threw herself upon the sympathy of her Hungarian subjects. The French

and Bavarians were speedily driven from her hereditary states; Prussia made a secret peace with the queen, who unwillingly abandoned Silesia and Glatz to Frederick; and though by the Treaty of Aix-la-Chapelle (1748) she was also compelled to give up the duchies of Parma, Piacenza, and Guastalla to Spain, her husband was elected emperor. During the time of peace which followed Maria Theresa, with the aid of her husband and the minister Kaunitz, made great financial reforms; agriculture, manufactures, and commerce flourished, the national revenue greatly increased, and the burdens were diminished. The Seven Years' war again reduced Austria to a state of great exhaustion, but on its conclusion the empress renewed her efforts to promote the prosperity of her dominions. Her son Joseph was elected king of the Romans in 1764, and on the death of her husband, in 1765, she associated the young prince with herself in the government. In 1772 she joined in the dismemberment of Poland, obtaining Galicia and Lodomeria, while in 1777 she acquired Bukovina from the Porte, and in 1779, by the Peace of Teschen, gained the Inn valley. She died in 1780. Of the sixteen children which she bore to the emperor ten survived her, one of whom was the unfortunate Marie Antoinette.

MARIE ANTOINETTE. See Antoinette.

MARIE DE MEDICI (mâ-rê dê med'i-chê), the daughter of Francis II. of Tuscany, born 1573, married in 1600 to Henry IV. of France. On the assassination of Henry she became regent, but proved utterly incompetent to rule. Her partiality for unworthy favorites caused her deposition and imprisonment. She became reconciled to her son, the weak Louis XIII., through Richelieu, who had possessed himself of the highest power, but was again imprisoned at Compiègne in 1630. Thence she escaped, and after wandering through several countries died in misery at Cologne (1642).

MARIETTA, a town, in Washington county, Ohio, the oldest town in the state. It is the seat of Marietta college, founded in 1835. Pop. 15,162.

MARIGOLD, a name of several composite plants. The common marigold is a native of France and of the more southern parts of Europe. It is an annual, from 1 to 2 feet high, with large deep-yellow flowers. It is as prolific as any weed, and was formerly used in broths and soups, partly to give color, and partly as an aromatic seasoning. It had also many medicinal virtues assigned to it. A number of species of this genus are indigenous to the Cape of Good Hope. The so-called African marigold and French marigold, common in flower borders, are both Mexican species, and have brilliant flowers.

MARINE CORPS, a body of soldiers enlisted for service in the navy, either on board ship or on shore at naval stations or elsewhere. Marines, as these soldiers are called in the United States and British navies, are a relic of the days when ships were manned by soldiers as their fighting complement. Instead of constituting the greater part of a ship's

company, they now form usually less than 15 per cent. of it. At the present time marines are used in the United States Navy on board ship and to guard naval stations at home and in the insular possessions; and when on board ship they constitute a quickly available infantry force for service abroad. Sailors are also drilled as infantry and artillery, but as their chief duties are connected with the ship, when they are landed the fighting efficiency of the ship is greatly reduced.

MARINE HOSPITAL SERVICE, a bureau in the treasury department of the United States, charged with the management of marine hospitals and relief stations for the cure of sick and disabled seamen of the American merchant marine. It has also under its supervision the national quarantine stations, the supervision of local quarantines, the investigation and suppression of epidemics and plagues, the collection and dissemination of mortality statistics and sanitary information, the scientific investigation of sanitary problems, and the examination of immigrants under the laws excluding those affected with contagious diseases. At present there are 23 marine hospitals, a sanitarium for consumptive seamen in New Mexico, and 115 relief stations.

MARINE LAW. See Commercial Law, International Law.

MARINER'S COMPASS. See Compass.

MARINES, a military force drilled as infantry, whose especial duty is to serve on board ships of war when on commission, and also on shore under certain circumstances. They are trained to seamen's duties, but do not go aloft, being mainly employed in sentry duty, etc. The force was first embodied by an order in council in 1664, as a nursery for seamen to man the fleet. The United States is the only other nation which employs marines in the same manner as Britain.

MARINETTE, the capital of Marinette co., Wis., on Green Bay, at the mouth of the Menominee river, and on the Chi. and N. W. and the Chi., Mil. and St. P. railways; 49 miles n. by e. of Green Bay. The city has a large lake traffic, and is principally engaged in the lumber industry, and in pulp and paper making. Pop. 19,260.

MARINO, San, a town and small independent republic in Italy. The territory consists of a craggy tract, with an area of about 22 sq. miles, on the borders of the provinces of Forlì and Urbino, near the Adriatic coast. It is the last surviving representative of the Italian republics. At the head of the government are two "captains regent" elected for six months. There is a militia of 950 men. The town San Marino occupies the crest of a rocky hill 2200 feet in height, and is accessible only by the road from Rimini. The principal inhabitants, however, reside in the hamlet of Il Borgo, at its foot. Pop. of the town about 1200; of republic, 9600.

MARION, the capital of Grant co., Ind., on the Mississinewa river, and the Cleve., Cin., Chi., and St. L., the Pitts., Cin., Chi, and St. L., and the Toledo, St. L. and Kan. City railways; 41 miles s. e. of Logansport, 67 miles n. e. of Indianapolis. Pop. 20,761.

MARION, the capital of Marion co., O., on the Cleve., Cin., Chi. and St. L., the Col., Hock. Val. and Toledo, the Col., Sandusky and Hock. Val., and the Erie railways; 40 miles n. of Columbus. Pop. 14,261.

MARION, Francis, American general, was born in 1732 at Winyah, near Georgetown, S. C. He was made lieutenant-colonel after the defense of Fort Moultrie at the entrance of Charleston harbor (June 28, 1776), and was present at the unsuccessful attack on Savannah, Sept. 1779. In August he joined Gates, but was detached a few days before Gates' defeat at Camden on August 16th; at Nelson's Ferry, on the 20th, he rescued 150 of the prisoners from a strong guard. He soon received a general's commission. In April Lee and Marion took Fort Watson, and in May Fort Motte. At Eutaw Springs he commanded the right



Francis Marion

under Greene. After the British retreat to Charleston, Marion went to an important session of the colonial assembly; on the very day that he returned to his brigade, February 24, 1782, it was surprised and dispersed, Marion arriving too late to recover the day. After the war he occupied himself with farming. He died February 27, 1795.

MARIONETTES. See Puppet-shows.

MARK, St., the Evangelist, according to the old ecclesiastical writers, the person known in the Acts of the Apostle as "John, whose surname was Mark" (Acts xii. 12, 25), for many years the companion of Paul and Peter on their journeys. His mother, Mary, was generally in the train of Jesus, and Mark was himself present at a part of the events which he relates in his gospel, and received his information partly from eye-witnesses. He was the cousin of Barnabas (Col. iv. 10), and accompanied Paul and him to Antioch, Cyprus, and Perga in Pamphylia. He returned to Jerusalem, whence he afterward went to Cyprus, and thence to Rome. He was the cause of the memorable "sharp con-

tention" between Paul and Barnabas. Of the close of his career nothing is known; and it is by no means certain even that the various passages, on which the church has based the biographical notes already cited, uniformly refer to the same individual. See Gospels.

MARK ANTONY. See Antonius.

MARKETS. See Fairs.

MARKET VALUE, the value of an article as established by public sales of such property in a particular locality. At times this value is proved by regular market quotations. It is also proved by persons familiar with the price at which such property sells regularly in the market. If the market price is abnormally enhanced or depressed at the time and place for delivery of any goods, by wrongful combinations or by an illegal monopoly, other evidence than the market sales may be resorted to for the purpose of showing the fair value of the property in question.

MARK TWAIN. The nom-de-plume of S. L. Clemens.

MARLBORO, a city in Middlesex co., Mass.; on the Fitchburg and the N. Y., N. H. and Hart. railways; 15 miles e. of Worcester, 25 miles w. of Boston. It is in a choice fruit-growing region, and is widely noted for its extensive manufacture of boots and shoes. Pop. 15,725.

MARLBOROUGH, John Churchill, Duke of, English general and statesman, second son of Sir Winston Churchill; born at Ashe, in Devonshire, in 1650. At the siege of Maestricht he distinguished himself so highly as to obtain the public thanks of the King of France. He had a regiment of dragoons presented to him, and strengthened his influence at court by his marriage with Sarah Jennings, an attendant upon the princess, afterward Queen Anne. On the accession of James II. he was sent ambassador to France, and soon after his return was created Baron Churchill of Sundridge, and raised to the rank of general. In 1691 he was suddenly dismissed from all his employments and committed to the Tower on the charge



Duke of Marlborough.

of high treason, but soon obtained his release; though it appears that the suspicions against him were not without foundation. On the death of Queen Mary he was made a privy-councillor, and appointed governor to the young

Duke of Gloucester; and in 1701 was created by King William commander-in-chief of the English forces in Holland, and also ambassador plenipotentiary to the states-general. In 1702 he drove the French out of Spanish Guelders, and took Liège and other towns, for which he was created Duke of Marlborough. In 1704 he stormed the French and Bavarian lines at Donauwörth, and in the same year, in conjunction with Prince Eugène, gained the victory of Blenheim over the French and Bavarians, headed by Marshal Tallard and the Elector of Bavaria. On the victory of Ramillies, 1706, a bill was passed to settle his honors upon the male and female issue of his daughters. In the campaign of 1707 his antagonist was the famous Duke de Vendôme, over whom he gained no advantage, and on his return, found that his popularity at court was on the decline. Early in 1710 he returned to the army, and with Prince Eugène gained another victory over Villars. During his absence a new ministry, hostile to himself, was chosen, and on his return his command was taken from him. He repaired in disgust to the Low Countries in 1712 and on the accession of George I. was reinstated in the supreme military command. Retiring from all public employments, his mental faculties gradually decayed, and he died at Windsor Lodge in 1722. His duchess, Sarah Jennings, born 1660, died 1744, has been almost equally celebrated for her boundless ambition and avarice. The title fell to the descendants of one of their daughters who have assumed the name of Churchill.

MARLINE-SPIKE, an iron pin tapering to a point, and principally used on board ship to separate the strands of a rope in order to introduce the ends of some other through the intervals in the act of knotting or splicing; it is also used as a lever in various operations.

MARLOWE, Christopher, an English poet and dramatist, born at Canterbury 1564. Besides six tragedies of his own composition, the best known of which are Tamburlaine the Great, Edward II., Dr. Faustus, and the Jew of Malta, he left a translation of the Rape of Helen, by Coluthus; some of Ovid's Elegies; the first book of Lucan's Pharsalia; and the Hero and Leander of Musæus, completed by George Chapman. He appears to have led a reckless, dissipated life, and died in 1593 from a wound received in a quarrel with a serving-man at Deptford. Marlowe was by far the greatest dramatic writer before Shakespeare.

MARLOWE, Julia, American actress, born near Keswick, England, in 1870. She came with her parents to this country when five years old. In 1887 she appeared in New York, but it was in Boston, in December, 1888, that she won, as Parthenia in Ingomar, an assured place as a star. She is an actress of unusual personal charm, and soon became a popular favorite in a variety of rôles, especially as Viola in Twelfth Night and as Rosalind in As You Like It. Among Miss Marlowe's successes in modern plays may be mentioned Barbara Frietchie in Clyde Fitch's play of

that name (1899); and Charlotte Durand in the dramatization of Cable's Cavalier (1902).

MAR'MALADE, a jellied preparation made from quinces, peaches, apricots, oranges, etc., and portions of their rinds, the most common kind being made from bitter or Seville oranges.

MARMALADE-TREE, Marmalade-plum, a tree of the order Sapotaceæ, a native of the West Indies and tropical America, valued for its fruit, the pulp of which resembles marmalade. It is also called Mammee-sapota.



Marmalade-tree.

MARMONT (mâr-môn), Auguste Frédéric Louis Viéssé de, Duke of Ragusa and Marshal of France, was born in 1774, and entered the army as a lieutenant of infantry in his fifteenth year. In 1792 he changed to the artillery, and at Toulon became acquainted with Bonaparte, who chose him for his aide-de-camp. He obtained the title of Duke of Ragusa for his defense of Ragusan territory against the Russians and Montenegrins. He was present at Wagram, and after the truce of Znaim was made field-marshal. In 1814 he fought a final battle under the walls of Paris, but opposition appearing fruitless he surrendered to the allies. This proceeding was one main cause of Napoleon's immediate abdication, and brought Marmont into favor with the Bourbons. After the restoration Louis XVIII. made him a peer of France, but he was compelled to withdraw from Paris by the revolution of 1830, and his name was struck off the army list. He accompanied Charles X. in his exile, and afterward traveled, publishing the results of his travels in 1837-39. He also wrote *Esprit des Institutions Militaires* and his own memoirs. He died at Venice in 1852.

MARMOSE, a marsupial quadruped resembling the opossum, but less, being



Marmose.

only about 6 inches in length exclusive of the tail. It carries its young about with it on its back.

MAR'MOSET, a name of several small South American monkeys, the smallest of the monkey tribe. They are agile in their movements, possess long, non-prehensile tails, and have a thick woolly fur. They bear a close resemblance to squirrels in general appearance, feed upon fruit and insects, and occasionally upon the smaller birds and their eggs.

MARMOT, a rodent quadruped classed with the squirrels. They are thick-bodied, have short tails and short legs, and live in burrows, which are generally excavated in mountainous situations, and consist of a series of galleries in which whole communities reside. During the winter they lie dormant. The marmots inhabit Europe, Northern Asia, and North America. The prairie-dog or prairie-marmot, or wistonwish, of North America is the most familiar American species. Another species is the woodchuck of the middle states.



The marmoset.

MARNE, a department of France, bounded by Ardennes, Aisne, Seine-et-Marne, Aube, Haute-Marne, and Meuse; 67 miles long by 60 miles broad; area, 3158 sq. miles. Pop. 429,424.

MARNE, Haute (Upper Marne, a department of France, bounded by Meuse, Marne, Aube, Côte d'Or, Haute-Saône, and Vosges; area, 2401 sq. miles. Chaumont is the capital. Pop. 247,781.

MAROCCO. See Morocco.

MAROONS', the name given to runaway negroes in Jamaica and in some parts of South America. In many cases they rendered themselves formidable to the colonists. When Jamaica was conquered by the English in 1655 about 1500 slaves retreated to the mountains, and continued to harass the island till 1795, when they were reduced by the aid of blood-hounds.

MARQUE, Letters of, or Letters of Marque and Reprisal, a license or extraordinary commission granted by a sovereign or the supreme power of one state to the citizens of this state to make reprisals at sea on the subjects of another under pretence of indemnification for injuries received; that is, a license to engage in privateering. Letters of marque were abolished among European nations by the Treaty of Paris of 1856. The United States of America were invited to accede to this agreement, but declined.

MARQUETTE (mār-kēt'), the county-seat of Marquette co., Mich., 170 miles west of Sault Sainte Marie; on Mar-

quette Bay, an inlet of Lake Superior, and on the Duluth, South Shore and Atlantic, and other railroads that connect with the mining centers of the Lake Superior mineral region. Pop. 12,315.

MARQUETTE, Jacques, a Jesuit missionary and explorer, was born in 1637, at Laon in France, and died May 18, 1675, on the banks of a small stream, now known as the Marquette, which has its mouth on the eastern shore of Lake Michigan. Having joined the Society of Jesus, he sailed for Canada in 1666, spent eighteen months in the vicinity of Three Rivers, founded the mission of Sault Sainte Marie, on Lake Superior, in 1668, and followed the Hurons to Mackinaw in 1671. It is mainly, however, as Joliet's companion in his voyage down the Mississippi in 1673, that Marquette holds a permanent position in the history of discovery in America. His narrative, first published in Thevenot's *Recueil de Voyages*, is printed along with other documents relating to him in Shea's *Discovery and Exploration of the Mississippi Valley*.

MARQUETRY, inlaid cabinet-work in which thin slices of different colored wood, sometimes of ivory, pearl, shell, or metal, are inlaid on a ground usually of oak or fir, well seasoned to prevent warping. At one time figures and landscapes were represented by means of marquetry, but it is now chiefly disposed in regular geometrical figures.

MARQUIS, Marquess, a title of honor next in dignity to that of duke, first given to those who commanded on the marches or frontiers of countries. The title was first introduced into England by King Richard II. in the year 1387, but fell into disuse until the reign of Edward VI., who created the Marquisate of Winchester in 1551. The corresponding female title is marchioness.

MARRIAGE, a solemn contract between a man and woman, by which they are united for life and assume the legal relation of husband and wife. Different localities have different forms of the institution, the most broadly marked of which are connected with the right to have only one wife—monogamy, or a plurality of wives—polygamy. Polyandry, by which a woman may have several husbands, is known to have existed in ancient times, and still exists in various localities, as in Tibet. Among the most civilized communities monogamy is the prevailing practice. Though the church of Rome ranks marriage among the sacraments, and religious observances are almost everywhere customary on its celebration, the law regards it as nothing more than a civil contract. To render valid the civil contract constituting marriage it is requisite that the free-will of each of the parties should be spontaneously exercised, and that each should be capable of giving an intelligent consent. In males the age of consent is sixteen, and in females fourteen. A promise to marry given by a person under twenty-one is not binding. The legal disabilities are: (1) An undissolved prior marriage, and the former husband or wife still living. (2) Being within the prohibited degrees of con-

sanguinity or affinity, cousins-german being the nearest relatives that may marry. Marriage with a wife's sister is prohibited as with one's own sister. (3) Impotence or inability to consummate the marriage. (4) The fraudulent suppression or alteration of the name of one or both in the publication of the banns; but this does not invalidate a marriage by license. Banns of marriage must be published three Sundays in the parish church or public chapel of the Establishment, in the parish wherein both parties reside, or in the parishes in which each separately resides. Ordinarily marriages must be celebrated in a church by a clergyman of the Church of England, or by a dissenting minister or a Roman Catholic priest in a building registered for marriages and in presence of the registrar, or they may be celebrated before the registrar and in his office. In the United States marriage is regarded as being entirely based on contract or on the present mutual consent of the parties; solemnization by a clergyman or by a magistrate, the presence of witnesses, and all the customary forms and ceremonies being simply convenient means of perpetuating the evidence of the contract. Marriage with a deceased wife's sister is not prohibited. The age at which a marriage may be contracted is the same as in England.

MARRIED WOMAN, a woman by marriage changes her legal status as to her personal rights, her contractual, property, and in some cases her political rights and her rights before the criminal law. After marriage, at common law, she is in a less favorable position in these respects than before, with the possible exception of at the criminal law when the presumption of her husband's coercion in case of criminal acts done in his presence makes her responsible for such acts except in the case of more serious crimes. Her personal property in possession and her chattels real, generally speaking, become her husband's or can be disposed of by him; in her real property he has an estate for their joint lives and may have an estate during his own life. Her rights in his property during their joint lives are practically limited to her right to the necessities of life, and the control over his real property that arises from her dower rights which enable her as a matter of law to refuse to release her dower right. The hardship of these disabilities of the common law has caused the courts of equity to give certain equitable remedies against the husband in order to protect her and her children in the enjoyment of at least a portion of her property, and to neglect some of the legal formalities in giving effect to agreements to create a separate estate for the wife, and to protect her by establishing the doctrine that the use of the separate estate must be for its use or her benefit, and that its income could not be anticipated. Modern legislation has removed some of these disabilities. The first tendency was to free the wife and her property from her husband's control but to make them jointly liable for all obligations as arise from the marriage relation. In most states the wife is free from common law disabilities.

MAR'RYAT, Frederick, English novelist and naval officer, born in 1792. His first attempt in literature was made in 1829, by the publication of *Frank Mildmay*. Its success led to an extensive series of works of the like kind, including *The King's Own*, *Peter Simple*, *Jacob Faithful*, *Japhet in Search of a Father*, *Newton Forster*, *Midshipman Easy*, *Snarley-Yow or the Dog Fiend*, *Masterman Ready*, and others. He was also the author of a *Code of Signals for the Merchant Service* (1837). He died at his residence, Langham, Norfolk, in 1848. One of his daughters, Florence Marryat, has gained distinction as a novelist.

MARS, the Roman god of war, at an early period identified with the Greek Ares, a deity of similar attributes. Like Jupiter he was designated father, and was regarded in particular as the father of the Roman people, Romulus and Remus being the fruit of his intercourse with Rhea Sylvia. Several temples at Rome were dedicated to him. His service was celebrated not only by particular flames devoted to him, but by the College of the Salii, or priests of Mars. The month of March, the first month of the Roman year, was sacred to him. As the tutelary deity of Rome he was called Quirinus, in his character as the god of war Gradivus (the striding). Ares, the Greek god of war, was the son of Zeus (Jupiter) and Hera (Juno). He is represented as terrible in battle, but not as invulnerable, since he was wounded at various times by Heracles, Diomedes, and Athena. He is represented as a youthful warrior of strong fame, either naked or clothed with the chlamys. The chief seats of the worship of Ares were in Thrace and Scythia.

MARS, of the superior planets that which lies nearest the sun, or next beyond the orbit of the earth. He moves round the sun in 686.9797 of our mean solar days, at the average distance of 139,312,000 miles, his greatest and least distances being 152,284,000 and 126,340,000 miles; his orbit is inclined to the ecliptic at an angle of $1^{\circ} 51' 5''$; his distance from the earth varies from about 35,000,000 to 244,000,000 miles; he rotates on his axis in 24 hours 37 minutes 22 seconds; the inclination of his axis, or the angle between his equator and his orbit, is 28° ; his diameter is about 4400 miles. His surface resembles that of the earth; but the seas, as the parts which have a greenish tinge are thought to be, cover a much smaller area than the reddish parts or land. The reddish hue of Mars is one of his characteristic features. About every 8 years 7 months he is in perihelion and perigee at the same time, and has a wonderful brilliancy. At his poles are white portions, which decrease and increase in size at the beginning and end of the Martial summer, so that the poles are supposed to be surrounded with snow. In 1877 two satellites, both very small bodies were discovered by Professor Hall of the Naval Observatory, Washington. The outer one, 14,500 miles distant from the center of Mars, revolves round the planet in a period of 30 hours 14 minutes; the inner one, 5800 miles from the center of Mars, has a period of 7 hours 38 minutes.

MARSEILLAISE HYMN (már-se-lāz'), the war-song of the French Republic. The words, and, as is generally believed, the music, were written in 1792 by Rouget de l'Isle, an officer in garrison at Strasburg, on the occasion of a body of volunteers leaving that city for the war against Austria and Prussia, and the poem was entitled by him *Chant de Guerre de l'Armée du Rhin* (War-song of the Army of the Rhine). It was called *Marseillaise* because first sung in Paris by volunteers from Marseilles.

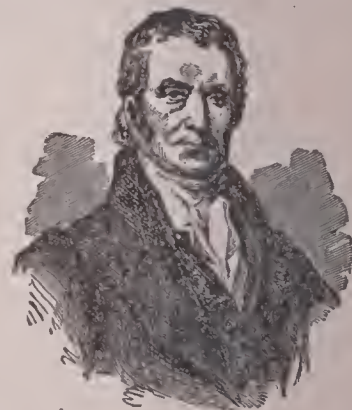
MARSEILLES, French Marseille (már-sāl', már-sā-yè), a city and the principal commercial seaport of France, on the Mediterranean, capital of the department of Bouches-du-Rhône. Though a handsome city as a whole, Marseilles is not rich in public edifices. The most deserving of notice are the large new cathedral in the Byzantine style; the church of Notre Dame de la Garde, on a hill of same name; the church of St. Victor; the Hôtel de Ville; the Prefecture; the Palais des Arts de Longchamp, with picture-gallery and natural history museum; the exchange; public library (100,000 vols.); and the triumphal arch through which the town is entered on the side of Aix. The most important manufactures are soap, soda, and other chemical products; also olive and other oils, sugar, machinery, iron and brass work, candles, glass, earthenware, etc. The trade is chiefly in soap, olive-oil, wine, brandy, corn, flour, dried fruits, tobacco, wool, skins, iron, cotton. Pop. 494,769.

MARSH, George Perkin, American scholar and diplomatist, born 1801. He graduated at Dartmouth College, studied law, and practiced at the bar. In 1842-49 he was a member of congress, and in 1849 was appointed American minister at Constantinople. Before returning in 1854 he made extensive travels in Europe. From 1861 till his death in 1882 he was American minister to Italy. Among his works are: *Lectures on the English Language*; *Origin and History of the English Language*; *Man and Nature*; etc.

MARSH, Othniel Charles, American zoölogist and paleontologist, was born in 1831 in Lockport, N. Y. Upon his return from Germany he was appointed professor of paleontology and curator of the geological museum at Yale, and held these positions until his death. Professor Marsh accomplished a great amount of valuable scientific work in the discovery and description of new fossil vertebrates from the geological formations of the Western states and territories. His discoveries of the fossil ancestors of the horse marked an epoch in evolutionary science and have been frequently employed as an illustration of the principle of evolution. He served as president of the American Association for the Advancement of Science in 1878, and of the National Academy of Sciences from 1883 to 1895. The Geological Society of London, of which he was a fellow, bestowed upon him the first Bigsby medal in 1877. He also received the Cuvier prize of the French Academy of Sciences. His valuable collection of fossil vertebrates was left to Yale University. He died in 1899.

MARSHAL, French Maréchal, a word of German origin signifying originally a man appointed to take care of horses. A similar term is the French *connétable* or constable, from L. comes stabuli (count or master of the stable). The marshal of the German Empire derived his origin from the Frankish monarchs, and was equivalent to the comes stabuli or *connétable*. He had to superintend the ceremonies at the coronation of the emperor, and on other high occasions. There is still a marshal at the head of the households of German sovereigns. In France *maréchal de France* is the highest military honor. In Germany general-field-marshal is the highest military honor. In England field-marshal is an honorary rank given occasionally to general officers. Another English title is *earl-marshal*. Marshal also signifies a person who regulates the ceremonies on certain solemn celebrations. In the United States a marshal is an executive officer (resembling the sheriff) connected with the United States courts.

MARSHALL, John, chief justice of the United States, was born in Fauquier co., Va., in 1755. At various times from 1782 to 1798 he was elected a member of the Virginia legislature, in 1788 a member of the Virginia convention for the ratification of the constitution; in 1797 he was envoy extraordinary to France, and in 1799 a member of congress; in 1800 he became secretary of state; and on January 31, 1801, he was



J. Marshall

appointed to the chief-justiceship, which position he held until his death. Marshall as a lawyer soon rose to the first rank at the Virginia bar, and acquired also a national reputation. In the Virginia convention of 1788 his influence was second only to that of Madison in securing the adoption of the constitution. But, unlike Madison, he continued under the constitution, to support the administration of Washington and federalist measures in general. It was as chief justice of the supreme court of the United States, however, that Marshall won lasting fame. His reports, filling about thirty volumes, form a work which time will only render more valued. He died in 1835.

MARSHALLTOWN, the county seat of Marshall co., Ia., on the Ia. Cent., the Chi. and N. W., and the Chi. and Gt.

West. railways; 70 miles w. of Cedar Rapids. Pop. 13,275.

MARSH-MALLOW, a common plant, growing in marshes, especially near the sea, in great abundance. It is employed medicinally as a demulcent, and is used in the preparation of demulcent lozenges. It is perennial, and has a white, fleshy, carrot-shaped root, which may be used as food. The stem is from 2 to 3 feet high, both leaves and stem being covered with a soft down. The flowers are flesh-colored. The hollyhock is another species.

MARSTON MOOR, in Yorkshire, about 7 miles west of York, a locality celebrated for the battle between the royal forces under Prince Rupert and the troops of the parliament under Fairfax and Cromwell (2d July, 1644), in which the latter were victorious.

MARSUPIA'LIA, or **MARSU'PIALS**, an extensive group of mammalia, differing from all others in their organization, and including genera which correspond to several orders of ordinary mammals. They belong to the aplacental mammals, and their most striking peculiarity is the production of the young in an immature state, a feature which renders necessary the pouch in which the immature young are placed immediately on their birth. In this pouch are the mammae or teats, and sheltered here the imperfect young ones, attached to the nipple by the mouth remain till fully developed. The marsupials link the mammals through the Monotremata to the birds and reptiles. There are many genera both herbivorous and carnivorous, the great bulk of them being confined to the Australian region. The kangaroo and opossum are familiar examples.

MARTEN, the name of several carnivorous quadrupeds. The body of the marten, like that of the weasel, is elongated and slender. The legs are short, the feet being provided with five toes, armed with sharp claws. In habit the martens differ from the weasels in being arboreal, these forms climbing



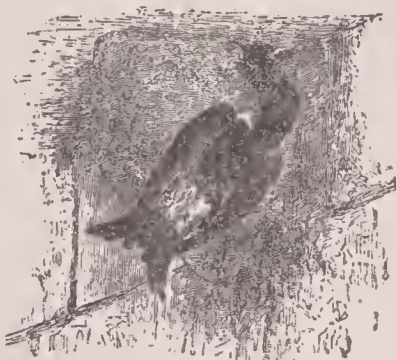
Pine-marten.

trees with great ease. The pine-marten occurs chiefly in North America and in the northern parts of Asia. It is of smaller size than the common marten, possesses a yellowish mark on the throat, and has a finer fur largely used for trimmings. It burrows in the ground. The famous sable marten which furnishes the valuable sable fur, is nearly allied to the pine-marten. It inhabits Siberia.

MARTHA'S VINEYARD, an island of Massachusetts, on the south side of Cape Cod, 12 miles west-north-west of Nantucket, 19 miles long, and from 2 to 10 broad. It contains one or two seaside resorts.

MARTIAL LAW, the law by which the discipline of an army is maintained, applying only to persons in actual military service, and only to their conduct in such service. The jurisdiction under the law martial is in a distinct tribunal, known as a court-martial appointed by some superior officer. Under special circumstances of insurrection or rebellion, where the ordinary law is insufficient to protect life and property, it is sometimes necessary to administer the law according to the practice of military courts, by an armed force occupying the disturbed district. The district is then said to be under martial law.

MARTIN, a name applied to several birds or swallows. It builds a globular nest under the eaves of houses, or in the upper angles of windows. In habits it



House-martin.

resembles the chimney-swallow, but its tail is less markedly forked, while its nest also differs, that of the chimney-swallow being cup-shaped.

MARTINIQUE (mār-ti-nēk'), one of the French West India Islands, in the Windward group, area, 380 sq. miles. Its loftiest summit, Mount Pelée, is 4450 feet high. The climate is hot, but not unhealthy. Hurricanes and earthquakes are not unfrequent. The principal town, St. Pierre, on the northwest was destroyed by an eruption of Pelée in May, 1902, in which many thousand people perished. Pop. 207,011.

MARTYRS, a name applied by the Christian church to those persons in particular, who in the early ages of Christianity, and during the great persecutions, suffered ignominy and death rather than renounce their faith. Festivals in honor of the martyrs seem to have been observed as early as the second century.

MARX, Karl, German socialist, born in 1818, studied law and philosophy at Berlin. After editing the *Rheinische Zeitung* at Cologne from 1841 till its suppression, he went in 1844 to Paris, where he took part in the publication of the *Deutsch-Französische Jahrbücher*, and a newspaper, *Vorwärts*. Being compelled to flee to Brussels, he there in 1848 became head of the central committee of the socialists. In the same year he made an attempt at Cologne to revive the *Rheinische Zeitung*, but removed to London in 1849. In 1864 he established the *International*, but after the disruption in 1872, when he led the extreme party, he removed from Lon-

don to New York. He died in 1883. His chief work, the Bible of one group of socialists, was *Das Kapital*, published in 1867.

MARY, The Virgin, the mother of Jesus, according to tradition embodied in the apocryphal gospels the daughter of Joachim and Anna (of Luke i. 32). The story of her life so far as it is given in the New Testament begins with her betrothal to Joseph (Luke i.), and the narrative of the birth of Christ. She is thrice mentioned during Christ's public ministry (John ii., Matt. xii. 47, John xix. 25-27), and once after his death (Acts i. 14). The title of Mary to adoration did not become a tenet in the orthodox Latin Church till the 6th century, when the Christian Church began to celebrate festivals in her honor, of which the Purification, the Annunciation and the Visitation (the visit of Mary to Elizabeth) are still retained in Protestant countries. The Greek and Roman Catholics, and the schismatic churches in the east, observe several feasts besides the above in honor of the Virgin; for instance the birth of Mary, and her death and reception into heaven (by the Roman Catholics called the Assumption). The festival of the Immaculate Conception is celebrated only by the Roman Catholic Church.

MARY I., Queen of England, daughter of Henry VIII. by Catherine of Aragon, was born in 1516. After her mother's death she was declared illegitimate, but was restored to her rights when the succession was finally settled in 1544. She was bred up by her mother in the Roman Catholic faith, on which account she was treated with rigor under Edward VI. She ascended the throne in 1553, after an abortive attempt to set her aside in favor of Lady Jane Grey. One of her first measures was the reinstatement of the Roman Catholic prelates who had been superseded in the late reign. Her marriage to Philip II. of Spain, united as it was with a complete restoration of the Catholic worship, produced much discontent, insurrections broke out under Cave in Devonshire, and Wyatt in Kent, which, although suppressed, formed sufficient excuses for the imprisonment of the Princess Elizabeth in the Tower, and the execution of Lady Jane Grey and her husband Lord Guildford Dudley. England was now formally declared to be reconciled to the pope; the sanguinary laws against heretics were revived, and nearly 300 perished at the stake, including Cranmer, Latimer, and Ridley. Under Philip's influence a war began with France, which ended in the loss of Calais in 1558, after it had been held by England for above 200 years. This disgrace told acutely upon Mary's disordered health, and she died in 1558.

MARY II., Queen of England, born in 1662, was daughter of James, duke of York, afterwards James II., by his wife Anne Hyde, daughter of Lord Clarendon. She was married in 1677 to William, prince of Orange; and when the revolution dethroned her father, Mary was declared joint-possessor of the throne with William, on whom all the administration of the government devolved.

During the absence of William in Ireland in 1690, and during his various visits to the continent, Mary managed at home with extreme prudence. She was strongly attached to the Protestant religion and the Church of England. She died of small-pox in 1694. See William III.

MARYLAND, one of the United States of North America; bounded n. by Pennsylvania, e. by Delaware and the Atlantic, s. by Virginia and Chesapeake bay and w. by Virginia and West Virginia; area, 12,210 sq. miles. The part of the state lying to the east of Chesapeake bay is called the Eastern shore, and the other on the west the Western shore. The Eastern shore has a low, flat, and somewhat sandy surface, covered in many places with stagnant water, which makes ague and intermittent fever prevalent. The Western shore gradually



Seal of Maryland.

risers toward the northwest, where it is traversed by a lower branch of the Appalachian chain, and attains the height of 2000 feet above sea-level. Beyond this the land again sinks, forming the Hagerstown valley, part of the great Appalachian valley. The chief rivers are the Potomac, the Susquehanna, and the Patapsco. Almost all the lower part of Maryland is covered with alluvial deposits. In the Hagerstown valley there is a full development of the carboniferous system, with its valuable seams of coal and ores of iron. There are three important coal-fields in the state. The most important crops are Indian corn, wheat, and oats. Tobacco is very largely grown. The fisheries are productive, and there are extensive oyster-beds. The principal manufactures are cotton goods, cordage, bricks, and articles in iron; the trade, chiefly foreign, is extensive. A large part of the foreign trade consists in the exportation of canned fruits, vegetables, and oysters. The state sends six representatives and two senators to congress. Annapolis is the seat of government; but Baltimore is the most important city of the state. There is an excellent system of free public schools, and among the higher educational institutions may be noted the St. John's College at Annapolis, and the Peabody Institute (founded in 1857), and the Johns Hopkins University (opened in 1876), both at Baltimore. Maryland was one of the thirteen original states of the Union, and was first settled in 1634 by English Roman

Catholics under Leonard Calvert, a brother of Lord Baltimore, who had obtained a charter from Charles I., of England. Unlike the Puritan colonists of New England, the early settlers of Maryland enacted laws granting toleration to all forms of religious belief. The early history was greatly disturbed by conflicts between Lord Baltimore's party and the traders who claimed under William Claiborne of Virginia. The Proprietary party finally established their power. In 1688 Lord Baltimore's deputies declined to proclaim William and Mary, and the result was a revolt which led to the overthrow of the feudal system, and Maryland became a crown colony. The Church of England was then established and disabilities were imposed upon Catholics and dissenters. In 1714 one of the Baltimore family became a Protestant and was recognized as the proprietor, and from this time until 1776 the Baltimores held possession. The original charter limits of Maryland, which was named after Henrietta Maria, queen of Charles I., included all of Delaware and a considerable part of Pennsylvania, and conflicted with the grant to William Penn. The controversy between the two colonies lasted from 1682 to 1760, when the Penn heirs proved successful and Maryland assumed its present limits, and Mason and Dixon's line was established to mark the boundaries in 1763-67.

In the war of independence Maryland bore a conspicuous part and furnished 20,636 men to the continental armies. In the war of 1812-14, the state had in the service no less than 42,636 men, a number only exceeded by the great states of New York and Virginia. In the war with Mexico Maryland's contribution was 2,500 men. In 1844 the first line of electric telegraph in the United States was run from Baltimore to Washington. In the civil war the people of Maryland were divided in sentiment. Many of her people favored secession, a large number entered the confederate army, and in the first days of the war the passage of Union troops through Baltimore was opposed, several Massachusetts soldiers being killed on April 19, 1861; but the strength of the Union party, added to the efforts of the governor served to keep the state from seceding. In national elections, Maryland balanced with fair regularity before the civil war between democrats and the federalists and whigs. In 1864 it voted for Lincoln, but from 1868 to 1892 was steadily democratic. In 1896 and 1900 it was carried by the republicans, and in 1904 it gave 7 electoral votes to Parker and 1 to Roosevelt. In 1908 it went Democratic. Pop. 1909, 1,188,044.

MARY MAGDALEN. See Magdalen.

MARY STUART, Queen of Scots, was born at Linlithgow Palace in 1542, and was the daughter of James V. by his queen, Mary of Lorraine, a princess of the family of Guise. In the summer of 1548 the young queen was sent by her mother to France, where she was educated in a French convent, and in 1558 was married to the dauphin, afterward Francis II. He died seventeen months

after his accession to the crown, in December, 1560, and in August, 1561, the widowed queen returned to Scotland. The calamities of Mary began with her second marriage, namely, to her cousin, Lord Darnley, whom she married on July 29, 1565. Darnley was a Roman Catholic, and immediately after the marriage the Earl of Moray and others of the Protestant lords combined against the new order of things. They were compelled to take refuge in England, and the popularity of Mary began to decline. In addition to this Darnley proved a weak and worthless profligate, and almost entirely alienated the queen by his complicity in the murder of Rizzio (March 9, 1566), though a reconciliation seemed to be effected between them about the time of the birth of their son, afterward James VI. of Scotland and I. of England (19th of June, 1566). About the close of the same year, however, Darnley withdrew from the court, and in the meantime the Earl of Bothwell had risen high in the queen's favor. Once more, however, an apparent reconciliation took place between the king and queen. Darnley had fallen ill, and was lying at Glasgow under the care of his father. Mary visited him, and took measures for his removal to Edinburgh, where he was lodged in a house called Kirk-of-Field, close to the city wall. He was there tended by the queen herself; but during the absence of Mary at a masque at Holyrood the house in which Darnley lay was blown up by gunpowder, and he himself was afterward found dead with marks of violence on his person (February 9, 1567). The circumstances attending this crime were very imperfectly investigated, but popular suspicion unequivocally pointed to Bothwell as the ringleader in the outrage, and the queen herself was suspected, suspicion becoming still stronger when she was carried off by Bothwell, with little show of resistance, to his castle of Dunbar, and married to him on the 15th of May. A number of the nobles now banded together against Bothwell, who succeeded in collecting a force; but on Carberry Hill, where the armies met on the 15th June, his army melted away. The queen was forced to surrender herself to her insurgent nobles, Bothwell making his escape to Dunbar, then to the Orkney Islands, and finally to Denmark. The confederates first conveyed the queen to Edinburgh, and thence to Loch Leven Castle, where she was placed in the custody of Lady Douglas, mother of the Earl of Moray. A few days after, on the 20th of June, a casket containing eight letters and some poetry, all said to be in the handwriting of the queen, fell into the hands of the confederates. They were held by the confederates to afford unmistakable evidence of the queen's guilt, and on the 24th of July she was forced to sign a document renouncing the crown of Scotland in favor of her infant son, and appointing the Earl of Moray regent during her son's minority. After remaining nearly a year in captivity Mary succeeded in making her escape from Loch Leven (May 2, 1568), and, assisted by the few friends who still remained

attached to her, made an effort for the recovery of her power. Defeated by the regent's forces at the battle of Landside (May 13, 1568), she fled to England, and wrote to Elizabeth entreating protection and a personal interview; but this the latter refused to grant until Mary should have cleared herself of the charges laid against her by her subjects. For more than eighteen years she continued to be the prisoner of Elizabeth, and in that time the place of her imprisonment was frequently changed, her final prison being Fotheringhay Castle, Northamptonshire. She was at last accused of being implicated in a plot by one Babington against Elizabeth's life, and having been tried by a court of Elizabeth's appointing, was on the 25th of October, 1586, condemned to be executed. There was a long delay before Elizabeth signed the warrant, but this was at last done on the 1st of February, 1587. Mary received the news with great serenity, and was beheaded a week later, on February 8, 1587, in the castle of Fotheringhay.

MAS'CALONGE, a fine North American fresh-water fish of the pike genus, inhabiting the St. Lawrence basin.

MASCAGNI (mā-skā'nyē), Pietro, Italian composer, was born at Leghorn in 1863. In 1879 he wrote a symphony in C minor, in 1881 a cantata. In 1890 the production in Rome of his opera *Cavalleria Rusticana* raised him from utter obscurity to the height of fame. His subsequent works have met with varying success. In 1895 he was appointed director of the Rossini conservatory at Pesaro. In 1902 he made a tour of America with limited success.

MAS'CARENE ISLANDS, the islands of Bourbon, Mauritius, and Rodriguez, so called from Mascarenhas, a Portuguese navigator, who discovered Bourbon in 1545.

MASHO'NALAND, the land of the Mashonas, in South Africa, on the northeast of Matabeleland and south of the Zambesi, being part of the territory of the British South Africa Company or Southern Rhodesia. It consists largely of open plains and table-lands, well-watered and fertile, and is believed to be very rich in gold. The Mashonas belong to the Kaffir race, and were formerly masters of a much wider territory, but have been cooped up within their present limits by the powerful Matabele. They are a peaceful people, clever as smiths and weavers. Salisbury is the chief place.

MASK, a covering for the face, often shaped so as to form a rude representation of the human features. They have been in use from the most ancient times. Among the Greeks they were used particularly in the processions and ceremonies attending the worship of Dionysus (Bacchus). As the origin of Grecian tragedy was closely connected with the worship of Dionysus, masks were used in it even in the beginning. The ancient masks usually covered the whole head, and accordingly represented the features, head, hair, and eyes. They had mostly very large open mouths, and seem to have had some effect in strengthening the voice of the speaker, this being required by the immense size of the ancient theaters.

The Roman theater differed little from the Grecian in the use of the mask, which the Italian popular theater, called *Commedia dell'Arte*, closely resembling the old Roman mime and pantomime, still retains. The mask used at masked balls or masquerades is a covering for the head and face made from a light stuff, a common form being the half-mask covering eyes and nose only. See *Masqued-ball*.

MASK, The Iron. See *Iron Mask*.

MASKELONGE. See *Mascalonge*.

MAS'KELYNE, Nevil, English mathematician and astronomer, born in 1732, educated at Westminster and Cambridge, chosen a fellow of the Royal Society, and in 1761 deputed to proceed to St. Helena to observe the transit of Venus. In 1765 he became astronomer royal; and in 1767 commenced the publication of the *Nautical Almanac*, which he edited till his death. In 1774 he was employed in observations on the eclipses of Jupiter's satellites; and the same year went to Scotland to ascertain the gravitational attraction of the mountain Schiehallien. He died in 1811.

MASON, Charles, born in England in 1730. For several years he served as assistant in the Greenwich, England, Observatory, and with Jeremiah Dixon, made an observation of the transit of Venus at the Cape of Good Hope in 1761. Two years later the two scientists were instructed to survey the boundary line between Pennsylvania and Maryland. They spent four years on this work, and the line then drawn became famous in the history of the United States, as practically marking the northern limit of the slave states. Mason and Dixon's line, however, must not be confounded with the boundary of 36° 30', beyond which slavery was not to be permitted in any territories of the United States. He died in 1777.

MASON, George, member of the federal convention of 1787, was born in Fairfax co., Va., in 1726. He served in the Virginia convention in 1775, and drafted its declaration of rights and plan of government. His most conspicuous service was in the federal convention of 1787, of which he was a member. He died October 7, 1792.

MASON, James Murray, born in Fairfax co., Va., November 3, 1798. He served many years in the Virginia house of delegates, and sat in congress as a democrat from 1837 to 1839. From 1847 to 1861 he sat in the United States senate from Virginia, but resigned to join the confederacy. In the autumn of 1861 he was appointed with John Slidell as commissioner from the confederate states to England. They sailed from Charleston, October 12th, for Cuba. Here they took passage for England on the British mail steamer *Trent*. This vessel was overhauled by a United States ship of war under the command of Commander Charles Wilkes, who demanded the bodies of Mason and Slidell, and the steamer being unarmed, the captain turned the men over to him. They were brought to Boston and confined in Fort Warren, and congress passed a resolution of thanks to Wilkes for his prompt action. The British government made

an immediate demand, and a peremptory one, for the delivery of the men, whom they claimed were protected by the British flag. There was a great outcry against surrendering them, but Abraham Lincoln showed his good sense and political wisdom by giving them up. This occurrence, known as the *Trent* affair, intensified the ill-feeling between England and the United States, which had grown out of the expressions of sympathy made by the English aristocrats for the confederates. He died in 1871.

MASON, John Young, born in Virginia in April, 1799. He was graduated at the University of North Carolina in 1816, and practiced law for many years in his native state. He sat in the state legislature and in congress from 1831 to 1837, then became a judge of the United States district court, and in 1844 was appointed secretary of the navy. In 1845 he became attorney general of the United States, and a year later returned to the navy department. From 1853 until his death he was minister to France. He died in 1899.

MASON AND DIXON'S LINE, the line of 39° 43' 26.3" north latitude, which separates the states of Maryland and Pennsylvania, in the United States. From the time of the grant of the latter territory to William Penn by Charles II in 1681 there were disputes between the family of Penn and that of the Lords Baltimore, the possessors of Maryland, as to the boundary between the two territories. An agreement was at last come to in 1760, the line of demarcation being named after the astronomers Charles Mason and Jeremiah Dixon, who traced the greater part of it. Milestones were set up along the whole of this boundary line.

MASON-BEES, a name given to insects which construct their nests with sand or gravel, agglutinated together by means of a viscid saliva, and fix them on the side of walls, etc., or avail themselves of some cavity for that purpose. The mason-bees, like the carpenter-bees, leaf-cutters, and other allied forms, are solitary in habits, not living in communities like the ordinary bees and wasps.

MASONRY, Free. See *Freemasonry*.

MASON-SPIDER, a spider more commonly known as the "Trap-door Spider" (which see).

MASON-WASP, a name given to certain hymenopterous, insects especially from their ingenuity in excavating their habitation in the sand.

MASQUE, or **MASK**, a dramatic entertainment much in favor in the courts of princes during the 16th and 17th centuries, in the latter particularly in England. In its earliest form it is perhaps best described as a masquerade with an arranged programme of music, dancing, etc., and a banquet. The first masque of this kind in England was performed in 1510, and they were frequently introduced into the plays of Shakespeare, Beaumont and Fletcher. The parts in the masques of the 16th and 17th centuries were usually represented by the first personages of the kingdom; if at court the king, queen, and

princes of the blood often performed in them.

MASQUED-BALL, an entertainment, generally of a public character, in which the company are masked or otherwise disguised by dominoes. The bal costumé in which the dancers appear in fancy costumes, but unmasked, is the nearest approach which American taste and law allow to this species of entertainment, which, from its nature, is peculiarly liable to abuse.

MASS, in the Roman Catholic Church, the prayers and ceremonies which accompany the consecration of the eucharist. The word is used generally for all that part of the Catholic service in which the eucharist is offered. At present the mass consists of four chief parts: 1. The introduction; 2, the offertorium, or sacrifice; 3, the consecration; 4, the communion. These four chief parts, of which the latter three are considered the most essential, are composed of several smaller parts, each having its proper denomination. They consist of prayers, hymns, shorter and longer passages of the Holy Scriptures, and a number of ceremonies, which, as the essential point of the mass is the sacrifice of the Lord, consist partly of symbolical ceremonies commemorative of important circumstances in the Savior's life, or signs of devotion and homage paid to the presence of the Lord in the host. The order of these ceremonies, and of the whole celebration of the mass, is given in the missal or mass-book. The masses are modified according to many circumstances, e.g. according to the saint in honor of whom the mass is celebrated or the seasons of the year connected with different events in the Savior's life, or the purpose for which the mass is said, as the missa pro defunctis (mass for the dead). Votive mass is an extraordinary mass, instead of that of the day, rehearsed on some special occasion. Low mass is the ordinary mass performed by the priest, without music. High mass is celebrated by the priest, assisted by a deacon and sub-deacon or other clergy, and sung by the choristers, accompanied by the organ and other musical instruments. Besides these there are different masses according to the different rites; the Greek mass, the Latin mass, the Roman mass and Gregorian mass, etc.

MASS, in physics, the quantity of matter in any body, or the sum of all the material particles of a body. The mass of a body is estimated by its weight whatever be its figure, or whether its bulk or magnitude be great or small. See Dynamics.

MASSA-CARRARA, formerly a small state of Italy. In 1859 it was united with those portions of the duchies of Parma and Modena lying west of the Apennines, and erected into the province Massa e Carrara. The province is celebrated for the Carrara marble. Area, 685 sq. miles; pop. 181,007.

MASSACHUSETTS, one of the Atlantic United States of North America, bounded north by Vermont and New Hampshire; east by the Atlantic; south by the Atlantic, Rhode Island, and Connecticut; and west by New York;

area, 8315 sq. miles; capital, Boston. The coast-line of the state, which has a length of about 250 miles, is indented with deep and extensive bays, of which Massachusetts Bay (which includes the large bays of Boston and Cape Cod), Buzzard and Nantucket Bays are the most capacious. The indentations in



Seal of Massachusetts.

these bays form excellent harbors, the most commodious of which are Newburyport, Boston Harbor, and Marblehead. The islands of Nantucket and Martha's Vineyard, with several others, belong to Massachusetts. The west part of the state is traversed by the Green Mountain, whose loftiest peak rises 3500 feet above sea-level. The most considerable rivers are the Connecticut, Housatonic, and the Merrimac. The soil is poor and sandy near the coast, where salt marshes frequently occur; but in the middle and western parts it is very fertile and well cultivated. Massachusetts has for many years been the largest producer of granite. Limestone is quarried and also an increasing quantity of marble, iron pyrite, corundum, iron manganese, tin, slate, and tripoli are also produced. The fishing industry is of great importance. Boston began to export fish as early as 1633, whales were caught off Nantucket in 1690 and New Bedford became famous in the whale fisheries. The United States Fish Commission and the state have extensive hatcheries. The climate is liable to extremes of heat and cold. The mean annual temperature is about 48°. The principal vegetable productions are Indian corn, rye, oats, potatoes, hemp, flax, pease, hops, beans, and pumpkins; wheat, buck-wheat, and barley are raised only in small quantities. A considerable portion of the surface of the ground is still covered with forests, consisting of pine, oak, walnut, birch, maple, ash, cedar, cherry, and chestnut. All varieties of fruit-trees are cultivated with success. Massachusetts is the fourth state in the Union in manufacturing, being excelled in this respect only by New York, Pennsylvania, and Illinois; but in proportion to its area and population it is the first. Lowell is the great center of the cotton manufactures. In the manufacture of boots and shoes—both leather and rubber—Massachusetts holds first rank. Worsteds, hosiery, silks, linens, etc., are also largely manufactured. There are numerous

forges and furnaces; machine-shops, manufactures of edge-tools, agricultural implements, cutlery, boots and shoes, etc. Ship-building is carried on extensively. In shipping Massachusetts is superior to any other state of the Union except New York. The means of internal communication are ample. In connection with the railways may be mentioned the Hoosac Tunnel piercing the Hoosac mountain in the northwest corner of the state, with a length of 5½ miles. In educational matters Massachusetts has a high reputation, among its leading institutions being Harvard university, the oldest in the Union, Boston university, and Amherst college. Massachusetts is divided into fourteen counties; and besides the capital, Boston, the chief towns are Worcester, Lowell, Cambridge, Fall River, Lawrence, and Lynn. Massachusetts was one of the thirteen original states of the Union. Its coasts were known to the early Norsemen, but its first authentic record is that of the discovery of Cape Cod in 1602. John Smith, of Pocahontas fame, explored it to some extent in 1614, but it was not until 1620 that the Puritans of the Mayflower effected their landing at Plymouth on December 21st. The Massachusetts Colony was established in 1628-30, and made the first settlement of Boston in the autumn of 1630. The early years of the colonists were made uneasy by continued difficulties with the Indians, who under Pequot, in 1637, and King Philip, 1675-76, caused much loss of life. The first settlers were Puritans of the Church of England; the religious liberty which they had sacrificed so much to obtain for themselves they denied to others and persecuted with impartiality Quakers, heretics, Catholics, and Protestant Dissenters, not to speak of burning women as witches.

Massachusetts was engaged in constant struggle with the English crown. In 1685, the crown finally annulled the charter of the colony, and sent orders to unite New York and New England under one rule. On the occurrence of the revolution of 1688, the people rose and reestablished their colonial government. The province of Maine was united in the new provincial charter of 1691, and Sir William Phips became the first royal governor, the attempt to unite New York with Massachusetts being abandoned. From this time until the accession of George III. to the English throne the history of Massachusetts forms one long record of struggle between the popular party and the home government as represented by the royalist governors.

The Puritan colony led in the active opposition to royal usurpation and the imposition of the Stamp Act, and in 1770 occurred what is known as the "Boston Massacre," when the regular troops fired into an unarmed crowd which had gathered for a lawful purpose. Three years later witnessed the Boston "tea-party," when a party of citizens, disguised as Indians, threw the taxed tea into the harbor. The British parliament retaliated by closing the port of Boston, and Gen. Thomas Gage was placed in command of the town. In

April, 1775, the first gun of the war was fired at Lexington. The royal forces were shut up in Boston, and the provincial troops, though technically defeated at Bunker Hill, won a great moral victory. Washington, who had been appointed to the chief command, compelled the British to evacuate Boston in March, 1776, and after this date there was no more fighting within the limits of Massachusetts. From 1776 until 1790 a provisional government had charge, and in the last-named year John Hancock became the first governor of the state.

The federal constitution was accepted by a small majority, but Massachusetts afterward became a stronghold of the federalist party. The state opposed the war with England in 1812-14, but furnished a large quota of seamen to the federal navy. During the following half century Massachusetts developed wonderfully as a manufacturing state and grew rapidly in power and influence. It became the home of the advanced thinkers who opposed slavery. Although the people at large were righteously opposed to the Mexican war, the state sent a regiment of over 1000 men under Calcb Cushing to aid in carrying it on. The whig party of which Daniel Webster was the chief exponent, supplanted the federalists, and split to form the free soilers and later the republican party. To the civil war the state contributed almost 160,000 troops and over \$50,000,000. In national elections Massachusetts has been federalist, whig, and republican with the exception of the years 1804 (Jefferson), 1820 (Munroe), 1824-1828 (John Quincy Adams). Pop. 1909, about 3,258,422.

MASSACHUSETTS AGRICULTURAL COLLEGE, a co-educational state institution at Amherst, Mass., chartered in 1863 and opened in 1867. Winter courses are offered for those unable to take the regular four years' course and special courses in botany, dairying, market gardening, and other departments are offered to women. The degrees conferred are B.S., M.S., and Ph.D.

MASSACHUSETTS BAY, a large bay to the east of the central part of Massachusetts; bounded on the north by Cape Ann, and on the south by Cape Cod.

MASSACHUSETTS HISTORICAL SOCIETY, the oldest historical society in the country, having been organized in 1781 and incorporated in 1794. Its objects are the collection, preservation, and diffusion of the materials for American history. The first volume of "Collections" was printed in 1792, and this has been followed by fifty more, together with about twenty volumes of "Proceedings." The society has a museum of relics and antiquities, and a fine library of 30,000 books, 60,000 pamphlets, and many rare manuscripts, including the Parkman collection of thirty volumes of manuscripts relating to the history of the French in Canada.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, a school of industrial science in Boston, Mass., established in 1861 for the purpose of instituting and maintaining a society of arts, a museum of arts, and a school of industrial science, and aiding generally by suitable means

the advancement, development, and practical application of science in connection with arts, agriculture, manufacture, and commerce. Thirteen distinct courses are offered, each of four years' duration: Civil engineering, mechanical engineering, mining engineering and metallurgy, architecture, chemistry, electrical engineering, biology, physics, general studies, chemical engineering, sanitary engineering, geology, and naval architecture. Each of these courses leads to the degree of Bachelor of Science. Within most of the regular courses a considerable latitude is permitted in the selection of branches, a partial choice of professional course being made at the middle of the first year, while in the fourth year nearly the entire time is devoted to professional subjects.

MASSAGE (mas'azh), a form of medical treatment in which the body of the patient, or some particular part of it, is subjected at the hands of an attendant to a variety of processes technically discriminated as stroking, rubbing, kneading, pinching, pressing, squeezing, and hacking. The tendency of this treatment is to assist and stimulate the circulation, and to increase the waste-removing action of the lymphatic vessels, and thus to affect the nutrition, not only of the parts acted upon, but of the whole body, and promote the removal of local swellings, inflammatory products, etc. The process, for which half an hour daily is usually sufficient, is performed upon the naked skin by the bare hands of the operator, no oil being used. The attendant should have a sufficient knowledge of anatomy to be able to separate out with the fingers a single muscle or group of muscles for treatment, and to trace the direction of the larger vessels and nerve-trunks and act upon them directly. The principal movements should be characterized by a certain uniformity and method. Thus in stroking with a steady pressure the limbs of the patient, the strokes should always be from the extremities toward the heart, not backward and forward in a random way; and in kneading the belly with the heel of the hand, the movements are carried round in the direction of the colon. The treatment has been remarkably successful in cases of nervous disorder of a hysterical kind, and in cases of wasting through imperfect nutrition dependent upon disturbances of stomach, bowels, or liver, and it has proved valuable in diabetes, some of the special diseases of women, and certain cases of paralyzed and contracted muscles.

MASSENA (màs-â-nâ), André, Marshal of France, born in 1758 at Nice. In 1775 he entered the French army. During the revolution he entered a battalion of volunteers, was elected chief of his battalion in 1792, and in 1793 made general of brigade. In 1799 he defeated the Austrian and Russian forces at Zürich, and in 1800, by his defence of Genoa for three months, gave Bonaparte time to strike successfully at Marengo. In 1804 he was created marshal of the empire. In 1807 he was given the command of the right wing of the French army in Poland, and soon after

received the title of Duke of Rivoli. In 1809 he distinguished himself against the Austrians, and at Esslingen his constancy and firmness saved the French army from total destruction. Napoleon rewarded him with the dignity of Prince of Esslingen. In 1810 he took command of the army in Portugal, and forced Wellington within the lines of Torres Vedras, till want of provisions compelled Masséna to retire. In 1814 he was made a peer by Louis XVIII., and though on the return of the emperor he acknowledged his authority, he took no active part in the events of the hundred days. He died in 1817.

MASNET (màs-nâ), Jules, French composer, born in 1842. He is the composer of several operas, of which the best known are *Herodias*, *Don César de Bazan*, and *Manon Lescaut*. His *Scènes Pittoresques* are also well known, and there is a long list of works by him, including the choral works *Maria Magdalene*, *Eva*, *La Vierge*, etc.

MAS'SILLON, a city in Stark co., Ohio, on the Tuscarawas river, the Ohio Canal, and the Cleve., Lorain and Wheel., the Penn., and the Wheel. and Lake Erie railways; 65 miles s. of Cleveland. It is in an agricultural, coal-mining, and sandstone-quarrying region. Pop. 13,325.

MASSILLON (màs-ê-yôn), Jean Baptiste, French pulpit orator, born in 1663 at Hyères, in Provence. The applause which he met with in Paris, even at court, was almost without example. Louis XIV. gave him special praise, and the deaths of Bossuet and Bourdaloue in 1704 left him at the head of the French preachers. He pronounced the funeral oration of Louis XIV. in 1715, and in 1717 the regent appointed him to the see of Clermont. In 1719 Massillon was chosen a member of the Academy. The same year he retired to his diocese, where he acted the part of a model prelate, and died in 1742. He was the greatest pulpit orator France has produced.

MASSINGER (mas'in-jér), Philip, a distinguished English dramatist, born at Salisbury in 1583. Little is known of his personal history beyond the fact that he was associated with Fletcher, Middleton, Rowley, and Dekker in the composition of certain plays. A note of his burial appears in the register of St. Savior's, Southwark; "March 20, 1639-1640, buried Philip Massinger, a stranger." As a dramatist Massinger is more natural in his characters and poetical in his diction than Jonson, and some critics rank him next to Shakespeare. In tragedy, however, he is rather eloquent and forcible than pathetic, and he is defective in humor. His best plays are the *Duke of Milan*, *A City Madam*, *A Very Woman*, *The Fatal Dowry*, *A New Way to Pay Old Debts*. The last-mentioned still maintains its place on the stage, chiefly on account of the characters *Marrall* and *Overreach*.

MAST. See *Ship*.

MASTER IN CHANCERY, an officer of a chancery or equity court, appointed to assist the chancellor or judge. His duties in general, are not prescribed by statute. It is a common practice to refer causes to a master for hearing, particularly

causes involving intricate accounts and requiring computations. A master is often appointed to examine witnesses, to take depositions, to inquire into and report the facts of a case to a chancellor or judge of the court, to make settlements under deeds, to discharge special acts under the direction and in behalf of the court, etc.

MASTER OF ARTS (M.A. or A.M.), an academical honor conferred by the universities of Britain, the United States, Germany, etc., upon students after a course of study and a previous examination in the chief branches of a liberal education, particularly languages, philosophy, mathematics, physics, and history. In the German universities the title is merged in that of Doctor of Philosophy (Ph.D.).

MASTICATION, the process of division of the food effected in the mouth by the combined action of the jaws and teeth, the tongue, palate, and muscles of the cheeks. This process is seen in its typical perfection in the higher Vertebrata only. By it the food, besides being triturated, is mixed with the salivary fluid. Imperfect mastication is a fertile source of indigestion.

MASTIFF, a race of large dogs found under various names from Tibet to England. The English mastiff is a noble-looking dog with a large head, a broad muzzle, lips thick and pendulous on each side of the mouth, hanging ears and smooth hair, the height at the shoulder usually ranging from 25 to 29 inches. The old English breed was brindled, but the usual color to-day is some shade of buff with dark muzzle and ears. The Tibet mastiff, which is also a fine animal, is common in Tibet and in Bhutan as a house dog.

MASTODON, an extinct genus of Proboscidea or elephants, the fossil remains of which first occur in the Miocene rocks of the Tertiary period, and which persist through the Pliocene and Post-pliocene epochs also. In general structure the mastodons bear a close resemblance to the existing species of ele-



• Mastodon restored.

1, Molar tooth, weighing 17 lbs. 2, Skull of mastodon of miocene period.

phants. Their chief peculiarities consist in the dentition and structure of the teeth. The geographical range of the mastodons included North America, Europe, and Asia—one species inhabited England, Germany, France and Italy. A specimen, almost entire, from the Pliocene deposits of Piedmont, measured 17 feet from the tusks to the

tail; and an American specimen measured 18 feet in length and 11 feet 5 inches in height.

MATABELELAND, the land of the Matabele, a warlike Kaffir race or people inhabiting part of South Africa between the Limpopo and Zambesi, north of the Transvaal, into which they removed from Natal in 1827 under their chief Moselikatse. It is now being rapidly settled and developed. Bulawayo is the capital.

MATAN'ZAS, a seaport on the north-west coast of Cuba, 52 miles east of Havana, with one of the largest, safest and most convenient harbors in America. It has considerable commerce, exporting sugar, molasses, and coffee, and ranking in importance next to Havana. Pop. about 40,000.

MATCHES, in the most common sense of the term, are splints or small slips of wood, one end of which is dipped into a composition that ignites by friction or other means. One of the first forms of this article was the brimstone match, which was a thin strip of resinous or dry pinewood with pointed ends dipped in sulphur, which were lighted with tinder ignited by a flint and steel. The lucifer-match was introduced in 1827, the inflammable substance being a mixture of chlorate of potash and sulphide of antimony, applied to the match, which had been previously dipped into melted sulphur. Safety matches were invented in Sweden in 1855, and are now extensively used. In the safety-match the composition is divided between the match and the friction paper attached to the box, so that the match can only be lighted in ordinary circumstances by being rubbed on the prepared paper. The compound put on the match consists of chlorate and bichromate of potash, red-lead, and sulphide of antimony, while the friction paper is coated with a mixture of amorphous phosphorus and sulphide of antimony.

MATCHLOCK, an old form of musket fired by means of a match. They were invented in the first half of the 15th century, and were succeeded by the arquebus. See Musquet.

MATE (mä'tā), the plant that yields Paraguay tea, a kind of holly. It has smooth, ovate-lanceolate, unequally serrated leaves, much branched racemes of flowers, the subdivisions of which are somewhat umbellate. In Brazil and other parts of South America the leaves are extensively used as a substitute for tea, the name Maté having been transferred to the plant from the gourd or calabash in which the leaves are infused. Boiling water is poured upon the powdered leaves, then a lump of burned sugar and sometimes a few drops of lemon juice are added. It contains theine, and acts as a slight aperient and diuretic.

MATERIALISM, in philosophy, that system which denies the existence of a spiritual or immaterial principle in man, called the mind or soul, distinct from matter; or in a more extended sense, the doctrine that is founded on the hypothesis that all existence (including, of course, the conscious subject) may be resolved into a modification of matter.

MATERIA MEDICA, the collective

name given to the materials with which physicians attempt to cure or alleviate the numerous diseases of the human body, and which comprehend a great variety of substances taken from the mineral, animal, and vegetable kingdoms—such as mercury, antimony, arsenic, and zinc, from among the metallic bodies; sulphur, lime, soda, nitre, magnesia, borax, and several salts, from among the other minerals; and some 200 substances belonging to the animal and vegetable kingdoms.

MATHEMATICS is the science in which known relations between magnitudes are subjected to certain processes which enable other relations to be deduced. Mathematical principles which are deduced from axioms with the help of certain definitions belong to pure mathematics, and those which have been deduced with the help of pure mathematics from certain simple physical laws, belong to mixed mathematics. Arithmetic, geometry, algebra, plane and spherical trigonometry, analytical or co-ordinate geometry, the differential and integral calculus, quaternions, the calculus of finite differences, etc., are departments of pure mathematics; the dynamics of rigid bodies and the application of its principles in astronomy and in investigating the actions of forces on ordinary matter, acoustics, the undulatory theory of light, optics, thermodynamics, electricity and magnetism, etc., are departments of mixed mathematics. See Algebra, Arithmetic, Dynamics, Geometry, etc.

MATHER, Cotton, D.D., American writer, born in Boston 1663. In 1685 he published his *Memorable Providences relating to Witchcraft and Possessions*, which was used as an authority in the persecution and condemnation of nineteen victims burned for witchcraft at Salem in 1692. He died in 1728 with the reputation of having been the greatest scholar and author that America had then produced, his publications, some of huge dimensions, amounting to 382.

MATHER, Increase, D.D., one of the early presidents of Harvard College,



Cotton Mather.

was born at Dorchester, Massachusetts, 1639; graduated at Harvard in 1656;

ordained a minister in 1661; president of Harvard College from 1685 to 1701. When King Charles II. signified his wish that the charter of Massachusetts should be resigned into his hands, in 1683. Dr. Mather contended against a compliance. In 1688 he was deputed to England, as agent of the province, to procure redress of grievances. He held conferences with King James II., and with William and Mary, and in 1692 returned to Boston with a new charter from the crown, settling the government of the province. He died at Boston in 1723.

MATHEW, Rev. Theobald, popularly known as Father Mathew, Irish apostle of temperance, was born in 1790, studied at Maynooth, and was ordained a priest in 1814. Shortly afterward he was appointed to a missionary charge at Cork, and established a society, on the model of those of St. Vincent de Paul, for visiting the sick and distressed. A more extended undertaking was the celebrated temperance crusade, which was so successful that in a few months he had 150,000 converts in county Cork alone. He died in 1856.

MATHEWS, Charles, an eminent English comedian, born in London 1776. He made his debut at Richmond in 1793, and after ten years' acting in the provinces made his first appearance in London at the Haymarket Theater in 1803. He instituted, in 1818, a species of entertainment in the form of a monologue which, under the title Mathews at Home, for five successive seasons drew crowded audiences to the English Opera House. In 1822 he played in America, and on his return in 1823 produced his *Trip to America*, which was as favorably received as his *At Home*. He continued both entertainments for upward of ten years. In 1834 he was again enthusiastically received in America, but was taken ill on the return voyage, and died at Plymouth in 1835. His powers of mimicry have perhaps never been surpassed on the stage. His son Charles James (born 1803, died 1878) long held a prominent place as a light comedian. His first wife was Madame Vestris, the celebrated actress. In his sixty-sixth year he made a tour of the world, gaining everywhere great applause for the grace and finish and exquisite humor of his acting.

MATRIX, in mining and geology, the rock or main substance in which any accidental crystal, mineral, or fossil is embedded.

MATTER, that which occupies space, and through which force is manifested. It is also that which makes itself known to us by our bodily senses, though there is believed to exist one kind of matter at least which is too subtle to be perceived by the senses, namely, the intermolecular and interstellar ether. Roughly speaking, matter exists in one of three states, solid, liquid, or gaseous, but these are not marked off by any distinct line. Matter is commonly regarded as the antithesis of mind.

MATTHEW, St., evangelist and apostle, son of Alphaeus; previous to his call a publican or officer of the Roman customs and, according to tradition, a native of Nazareth. After the ascension of Christ

we find him at Jerusalem with the other apostles, but this is the last notice of him in Scripture. Tradition represents him as preaching fifteen years in Jerusalem, then visiting the Ethiopians, Macedonians, Persians, Syrians, etc., and finally suffering martyrdom in Persia. His Gospel has been supposed by some critics to have been originally written in Hebrew, or rather Aramaic, but it is only found in Greek. The chief aim of this Gospel is evidently to prove the Messianic character of Jesus. See Gospel.

MATTHEWS (James) Brander, American author was born in New Orleans in 1852. In 1892 he was made a professor in Columbia, and soon won eminence in America as a critic of dramatic literature. His writings consist of essays on the theater, of comedies, and of short stories. Among his best known works are *His Father's Son*, *A Confidant of Tomorrow*, *Americanisms and Brittishisms*, *Margery's Lovers*, *In the Vestibule Limited*, *The Historical Novel* and other essays, *Actors and Actresses of the United States*, etc.

MATTOON, a city in Coles co., Ill., on the Ill. Cent., the Cleve., Cin., Chi. and St. L., and the Peoria, Dec. and Evans. railways; 56 miles w. of Terre Haute, Ind., 172 miles s. by w. of Chicago. It is in a corn and broom-corn growing region. Pop. 11,510.

MAUPASSANT (mô'pâ'sân'), Henri René Albert Guy de, French novelist, one of the greatest modern writers of short stories. His first story, *Boule de Suif*, published in 1881, revealed a finished master of the naturalistic school. Among his well known works are *La Maison Tellier*, *Mlle Fifi*, *Bel Ami*, *Pierre et Jean*, and *Notre Coeur*. He died in 1893.

MAUREPAS (môr-pâ), Jean Frédéric Phélippeaux, Count de, French statesman, born in 1701. An epigram on Madame de Pompadour led to his banishment from the court in 1749, but Louis XVI. recalled him in 1774, and placed him at the head of his ministry, and he retained the confidence of the king till his death in 1781. The restoration of the parliaments was the principal measure of his later ministry.

MAURICE, of Saxony, Count. See Saxe.

MAURICE OF NASSAU, Prince of Orange, stadtholder of the Netherlands, the youngest son of William the Silent, was born 1567. He died at the Hague in 1625, and was succeeded by his brother Frederick Henry.

MAURICIUS, Flavius Tiberius, one of the greatest Byzantine emperors, was born about 539 A.D. He distinguished himself in war against the Persians, obtaining by his complete victory over them in 581, the honor of a triumph at Constantinople. A defeat of the Byzantines by the Avars, and the massacre of the Byzantine prisoners, whom Mauricius declined to ransom, led to a revolt of his troops on the Danube. They marched on Constantinople under Phocas, who was proclaimed emperor (602), and Mauricius was seized and executed in 603.

MAURITIUS, or **ISLE OF FRANCE**, an island in the Indian Ocean, a colony

of Great Britain, 400 miles east from Madagascar; area, 705 sq. miles. Pop. 371,655.

MAURY, Matthew Fontaine, American naval officer and hydrographer, born in Spottsylvania co., Va., in 1806. In 1839 he sustained a fracture of the leg which made him a cripple for life. This accident led to his being appointed to the Naval Observatory and Hydrographic office in Washington, where he made a study of old ships' logs, the result of which was a series of Wind and Current Charts that were of incalculable benefit to navigators. Here also he prepared his *Physical Geography of the Sea and Its Meteorology*. He died in 1873.

MAUSER, (mou'zër), Paul, German inventor, was born at Oberndorf, Württemberg in 1838. In 1879 he invented the Mauser revolver, and in 1882, in conjunction with his brother, he succeeded in securing the adoption by the Servian government of an improved rifle known as the "Mauser, 1882." He is principally known, however, for his invention of the Mauser magazine rifle, and a magazine revolver. (See Small Arms.) His weapon was distinguished for its low trajectory, and the projectile which it fired for its penetrative power. In 1898 he was elected a member of the Reichstag.

MAUSOLE'UM, a sepulchral monument, so named from Mausölus, a king of Caria, to whom his wife Artemisia erected a monument which became so famous as to be esteemed the seventh wonder of the world, and to give a generic name to all superb sepulchres. From Pliny we learn that its height was 140 feet. In modern times the term is applied generally to a sepulchral edifice erected for the reception of a monument, or to contain tombs.

MAUVE, a beautiful purple dye obtained from aniline, used for dyeing silks, etc. In silk and wool the colors are permanent without the use of mordants.

MAXIL'LA, the term applied in comparative anatomy to the upper jawbones of Vertebrates, in contradistinction to the mandible or lower jaw; and in Invertebrata to the second or lesser pair or pairs of jaws. Thus in insects, spiders, crustaceans, etc., the maxillæ form definite and important organs in the trituration and division of food.

MAX'IM, Sir Hiram Stevens, American civil, mechanical, and electrical engineer, inventor of the automatic system of firearms, was born in Sangersville, Maine, in 1840. In 1878 he invented an incandescent lamp capable of burning for 1000 hours. Other important inventions were "a method of flashing electric carbons" and "a process to standardize carbons for electric lighting." In 1880 he went to Europe and exhibited some of his inventions at the Paris exposition of 1881. His most celebrated invention was the Maxim gun (see Machine Guns). More than one hundred international patents relating to petroleum and other motors, explosives, smokeless powders, and so on, were taken out by him. Maximite powder, a smokeless high explosive, was one of his discoveries. He became a naturalized

citizen of Great Britain because of the alleged unfair treatment of his inventions by the United States government. He was made a chevalier of the Legion of Honor and was created a knight by the English crown in 1901.

MAXIMIANUS, Marcus Aurelius Valerius Herulius, a Roman emperor, who became colleague of Diocletian in the empire 286 A.D. He endeavored to murder his rival Constantine, to whom he had given his daughter Faustina in marriage, and being frustrated by the fidelity of the latter, strangled himself 310. He was the father and contemporary of Maxentius.

MAXIMILIAN I., Emperor of Germany, son of the Emperor Frederick III. and of Eleonora of Portugal, was born in 1459; in 1486 was elected king of the Romans, and emperor in 1493.



Maximilian I.

He first became an independent prince by his marriage with Mary of Burgundy, the daughter of Charles the Bold, who was killed in 1477. He died in 1519, and was succeeded by his grandson Charles V. See Germany.

MAXIMILIAN II., Emperor of Germany, born 1527, died 1576. He succeeded his father, Ferdinand I., in 1564.

MAXIMILIAN, Emperor of Mexico, known in his earlier life as Ferdinand Maximilian Joseph, Archduke of Austria, born at Vienna, 1832, was the younger brother of Francis Joseph I. of Austria. In 1863 he was induced by the Emperor Napoleon, to accept the throne of Mexico. With this intention he entered Mexico in June, 1864. Having become involved in financial and political difficulties, Maximilian, with the approval of Napoleon, resolved to abdicate (1866), and he had proceeded to Orizaba when he was induced to return by the conservative party in the state. The fighting which followed culminated in the capture and execution of the emperor and two of his chief generals, 19th June, 1867.

MAXIMILIAN JOSEPH, King of Bavaria, born 1756, died 1825. He married his daughter to Eugene Beauharnais, son of Napoleon's wife Josephine, and had his duchy raised to a kingdom in 1806. In 1813 he joined the league against France.

MAXIMINUS, Caius Julius Verus, Roman emperor, the son of a peasant of Thrace. He entered the Roman army under Septimus Severus before 210, and gradually rose in rank until, on the death of Alexander Severus, he caused himself to be proclaimed emperor, A.D.

235. He was successful in his German campaigns, but his acts of barbarity and tyranny provoked an insurrection, in the attempt to quell which he was assassinated by his own soldiery, A.D. 238. The emperor is represented as being of immense stature and strength.

MAXIMITE, an explosive used in the bursting charge of shells. It is impossible to explode it by shock but is easily detonated by a suitable fuse. It melts at a temperature of 174 when heated in air. When detonated the products of combustion are almost wholly gaseous. In an unconfined state it burns slowly without explosion; heated it melts and evaporates rapidly but not explosively. It was invented by Sir Hiram Maxim.

MAXIMUM, is the greatest quantity or degree fixed, attainable, or attained, in any given case as opposed to minimum, the smallest. In mathematics and physics maximum is used also for the value which a varying quantity has at the moment when it ceases to increase and begins to decrease.

MAY, fifth month in the year, but third in the old Roman calendar, has thirty-one days. The Romans regarded it as unlucky to contract marriages during its course—a superstition still prevalent in some parts of Europe. On the 1st of May the old Celtic peoples held a festival called Beltane. In former days out-door sports and pastimes on the first of May were very common, and are not yet entirely given up. They included the erection of a May-pole decorated with flowers and foliage, round which young men and maidens danced, one of the latter being chosen for her good looks as queen of the festival, or "Queen of the May."

MAY-APPLE, a plant, a native of North America, and its creeping root-stalk affords an active cathartic medicine



May-apple.

known as podophyllin. The yellowish pulpy fruit, of the size of a pigeon's egg, is slightly acid, and is sometimes eaten.

MAYENCE (mā-yāns). See Mainz.

MAYENNE (mā-yen), a department of northwestern France, named from the small river Mayenne, which joins with the Sarthe to form the Maine; area, 1996 sq. miles. Laval is the capital. Pop. 313,103.

MAYO, a western maritime county of Ireland, in Connaught; area, 1,360,731 acres, of which about an eighth is under tillage. Principal towns, Castlebar (the county town), Ballina, and Westport. Pop. 199,166.

MAYO, Frank, American actor, was born in Boston in 1839. In 1863 he became a leading man in San Francisco and in 1865 in Boston. He appeared in Othello, Hamlet, Ferdinand in The Tempest, and other classic rôles, but his greatest success was as Badger in The Streets of New York, till in 1872 he brought out Davy Crockett. Among his later productions were his own dramatization of Nordeck and of Mark Twain's Pudd'nhead Wilson, the latter a character well suited to display his peculiar gifts as a comedian. He died in 1896.

MAYO, Richard Southwell Bourke, sixth Earl of, born 1822; entered parliament in 1847 under the title of Viscount Naas; was made chief secretary for Ireland under the Derby administration (1852-68). He succeeded to the earldom in 1867, and was appointed viceroy of India by Mr. Disraeli in 1868. After a successful career in this capacity, he was assassinated at Port Blair in the Andamans by a Mohammedan convict in 1872.

MAYOR, the chief magistrate of a city or corporate town in England, Ireland, the British colonies, and the United States. The mayor is elected by the people, and holds office for two years. In some of the larger cities the term has been lately extended to four years. The mayors of London, York, Dublin, and two or three other towns, are called "lord-mayor;" the lord-mayor of London having also the title of "right honorable," first allowed in 1354 by Edward III. Mayors are ex-officio justices of the peace during both their year of mayoralty and the following one.

MAZANDERAN, or **MAZENDERAN**, a province of Persia, bounded on the north by the Caspian Sea. The capital is Sari, and the population of the province is estimated at 300,000.

MAZARIN (mā-zā-ran), Jules, or **GIULIO MAZARINI**, first minister of Louis XIV. and cardinal, an Italian by origin, born in 1602, died 1661. He entered the pope's military service, and distinguished himself by diplomatic ability, for which he was rewarded with two canonries, and the appointment of nuncio to the court of France (1634-36). Here he gained the favor of Richelieu; accepted service from the king, and became a naturalized citizen of France; was made a cardinal in recognition of his diplomatic services in Savoy and in 1642, when Richelieu died, Mazarin promptly succeeded him. On the death of Louis XIII. the queen, Anne of Austria, became regent for her young son, Louis XIV., and it was thought that Mazarin would be dismissed; but instead he gained over the queen-regent, and made himself master of the nation. The parliament of Paris denounced his increasing taxation, while the nobility dreaded his supremacy, and the combination of these malcontents resulted in the civil war of the Fronde (which see). As the immediate result of the conflict, Mazarin had to go into exile, but finally returned to his position at court in 1653. During the succeeding eight years he remained all-powerful in

France. Just as his foreign policy was successful, so was his home policy disastrous. He did nothing for the people but increase their taxes to fill an impoverished exchequer. Yet when he died Mazarin left an enormous fortune to his nieces, whom he had married into the most powerful families of Italy and France.

MAZEP'PA, John, Hetman of the Cossacks, born about 1645. He became page to the King of Poland, and being detected in an intrigue with a Polish lady of high rank, Mazeppa was bound naked upon an untamed horse by her husband and cast loose. He was found and released by some peasants, and afterward joined the Cossacks, where his skill, sagacity, and strength procured him the position of hetman in 1687. He gained the confidence of Peter the Great, who made him prince of the Ukraine; but having entered into a treasonable intrigue with Charles XII. he suffered defeat with the Swedish monarch at Pultawa, fled to Bender, and there died in 1709. He is the hero of a poem by Lord Byron, and a drama by Pushkin.

MAZUR'KA, or **MAZOUR'KA**, a lively Polish round dance in $\frac{3}{4}$ or $\frac{4}{4}$ time, and generally danced by four or eight pairs. It is quicker than the polonaise. The name is also applied to the music.

MAZZINI (mât-sē'nē), Giuseppe, Italian patriot, born at Genoa 1805, died at Pisa 1872. While he was an advocate he turned his attention to literature, his first significant essay being Dante's Love of Country. As his writings grew more distinctly liberal in their politics the government suppressed the *Indicatore Genovese* and the *Indicatore Livornese*, the papers in which they appeared. He afterward joined the Carbonari, and was imprisoned in Savona for some months. On his release (1832) he was exiled to Marseilles, but he was compelled by the French government to retire into Switzerland. During the following five years he planned and organized various unsuccessful revolutionary movements, until, in 1837, he was expelled by the Swiss authorities and sought refuge in London. During the revolutionary movements of 1848 he proceeded to Italy; served for a time under Garibaldi, and when the pope fled from Rome he became president of its short-lived republic, made a heroic defense of the capital against the French, until compelled to surrender. From that time he continued to organize various risings in Italy, and the successful Sicilian expedition of Garibaldi in 1860 was due largely to his labors.

MEADE, George Gordon, American soldier, born of American parentage at Cadiz, Spain, in 1815. In October, 1836, he resigned from the army and adopted the profession of civil engineer. In 1842 he was reappointed to the army as a second lieutenant in the corps of topographical engineers. On the breaking out of the war with Mexico, when General Taylor crossed the Rio Grande, he was ordered to the front, and served with distinction throughout the war. At the outbreak of the civil war he was ordered to Washington; was commis-

sioned brigadier-general of volunteers in 1861, and was placed in command of the second brigade of the Pennsylvania reserve corps. In 1862 he was commissioned major-general of volunteers. He was engaged in the battles of Fredericks-



Gen. Geo. G. Meade.

burg and Chancellorsville, covering the retreat at Chancellorsville with his corps and guarding the crossings until the entire army was safely over the Rappahannock. On June 28, 1863, he succeeded General Hooker in the command of the Army of the Potomac. On July 1st the hostile armies met at Gettysburg, and a three days' battle ensued, which resulted in the utter discomfiture of Lee, who, however, was not pursued with any vigor. For this victory Meade was publicly thanked by a resolution of congress, passed January 28, 1866. From May 4, 1864, to April 9, 1865, General Meade commanded the Army of the Potomac, under General Grant, through the bloody struggle in the Wilderness, and until the surrender of Lee. On August 18, 1864, he was commissioned a major-general in the United States army. He died in 1872.

MEADOW-LARK, a North American starling-like bird frequenting meadows and open places. Few American song-birds are more general favorites. It is a near relative of the bobolink, oriole, and blackbird. The common meadow lark of the eastern states ranges in summer from New Brunswick to the Gulf of Mexico, east of the Mississippi and even in winter only retreats as far south as Southern New England and Illinois. The western meadow-lark occupies the western half of the continent and extends southward into Western Mexico, while other subspecies occur in Cuba and Mexico. They are somewhat less than a foot in length, with large feet and a long, straight, sharp bill. The feathers of the upper surface are prevalingly black, with rufous and buff borders and tips, so that the whole upper surface is variegated with those three colors. The throat, breast, and anterior half of the belly are bright yellow, with a prominent black crescent about the middle of the breast. The tail feathers are narrow and short, and when the bird takes to the wing the white outer ones become very conspicuous. The notes of the meadow-lark are clear and strong—a sort of cheerful whistle—but they differ in different localities, so that the notes of the Florida birds are markedly different from those heard in the northern states. The notes of the western meadow-lark are famous for their musical quality.

MEADVILLE, a town in the northwest of Pennsylvania, the seat of Allegheny College (Methodist Episcopal)

and a Unitarian theological school. Pop. 12,120.

MEAL-WORM, the larva of a beetle, which infests granaries, corn-mills, bake-houses, etc., and is very injurious to flour, meal, and the like.

MEAN, in mathematics, a quantity having a value intermediate between those of two other quantities. The arithmetical mean between two quantities is equal to half their sum; the geometrical mean to the square-root of their product; and the harmonic mean to twice their product divided by their sum.

MEASLES, also called Rube'ola, an acute infectious fever, chiefly affecting children. In a period of from ten to fourteen days after contagion symptoms of the disease begin to appear in sneezing, watering of the eyes, hoarseness, a hard cough, and high temperature. On the fourth day of the fever a rash appears in blotches, crescentic in form, first upon the temples, and gradually extends over the whole surface of the body. It begins to fade about the seventh day. The complications most to be dreaded are inflammations of the mucous membranes of the eye and chest. The treatment consists in keeping the patient confined to bed in a warm room, relieving the chest by hot bathing or warm packing, and preventing constipation. During convalescence give good nourishing food.

MEASURES, See Weights and Measures.

MEATH (mēth), a county of Ireland, province of Leinster, abutting on the Irish sea; area, 579,861 acres. Pop. 67,463.

MECCA, or **MEKKA**, a city of Arabia, about 60 miles from Jidda, its port on the Red Sea, and the birth-place of Mohammed, consequently the holiest city of the Mohammedan world. In its center is the Beitu-'llah (house of God) or El-Haram (the inviolable)—the great mosque inclosing the Kaaba, occupying a square dividing the upper from the lower town. The city is annually filled at the time of the Hajj or pilgrimage to the Kaaba. This pilgrimage, enjoined by Mohammed on all his followers, is the sole foundation of Mecca's fame, and the only source of its wealth and occupation. The pop. is estimated at 50,000, with the periodical addition of from 100,000 to 150,000 pilgrims.

MECHAIN (mā-shā), Pierre François André, French astronomer, born 1744, died 1804. His name is notably connected with the measurement of a degree of the meridian in order to get a natural basis for the new French decimal system of weights and measures.

MECHANICAL POWERS, the simple instruments or elements of which every machine, however complicated, must be constructed; they are the lever, the wheel and axle, the pulley, the inclined plane, the wedge, and the screw. See those terms.

MECHANICS, the term originally used to denote the general principles involved in the construction of machinery. Latterly the term became divorced from all direct connection with practical applications, and dealt entirely with abstract questions in which the laws of

force and motion were involved. In this sense mechanics is usually divided into dynamics, which treats of moving bodies and the forces which produce their motion; and statics, which treats of forces compelling bodies to remain at rest. See Dynamics, Statics.

MECHANICS' LIEN, a statutory lien or charge upon real estate to secure payment for work and labor performed on, or materials furnished for, buildings or other improvements thereon, at the request or with the consent, express or implied, of the owner. With the development of business customs much work which was formerly done by persons acting as servants for a master came to be performed by independent contractors who stood on an equal footing with those who engaged them. For the protection of such contractors and of material men whose wares are used in buildings and other improvements on real estate, the statutes known as "mechanics' lien laws" have been enacted in all the United States and in Canada. The theory on which mechanics' liens are given by statute is that the value of the real estate has been increased by the addition of the improvements on which the work was performed or materials furnished, and that the property should accordingly be held subject to such claims. This creates a preference of these claims over those of unsecured creditors of the owner, but a mechanics' lien is subject to valid prior liens on the real estate, such as mortgages, judgments, taxes, etc. The term mechanics' lien is used in a general sense to cover all liens for labor, whether skilled or unskilled, and to describe liens for materials furnished. These liens give a right to look to the property for compensation, but do not create a personal claim against the owner. As a general rule, the lien attaches both to the building or improvement and to the land on which it is erected; but if the improvement is placed on the land without the owner's consent the lien will not extend to the land, but will cover the improvement to the extent of the interest of the person who ordered the work and materials. The lien only attaches to the very property on which the work was done, and will not affect the other real estate of the owner. A mechanics' lien may be filed against any title or interest in real estate, even though it is quite limited, as a lease for a year, provided it is such an interest as may be sold on execution.

As a general rule the work to which the owner is entitled under a contract must be entirely performed before the contractor can file a lien, but where an owner defaults in his payments or otherwise breaks his part of the contract, the right to file a lien usually attaches at once. In order to perfect a mechanics' lien the statutes of most jurisdictions provide that a notice setting forth the names of the owner and the party claiming the lien, the character of the work done, a description of the premises, the total contract price, the amount paid thereon, the amount still due, and the date when the last item of work was performed, shall

be filed in the county clerk's office and a copy thereof served on the owner of the property affected.

MECKLENBURG-SCHWERIN, a grand duchy of the German Empire; bounded on the north by the Baltic Sea, elsewhere chiefly by Prussia and Mecklenburg-Strelitz; area, 4847 sq. miles. Pop. 607,835.

MECKLENBURG-STRELITZ, a grand duchy of the German Empire. Pop. 102,628.

MECONIC ACID, an acid with which morphia is combined in opium. When pure, meconic acid forms small white crystals. Its aqueous solution forms a deep red color with the persalts of iron, which therefore are good tests for it.

MEDALLION, a term applied to the large antique medals struck in Rome and in the provinces by the emperors. They were usually of gold or silver, and exceeded in size the largest coins of these metals of which the name and value are known. They were probably struck to commemorate persons or events. In architecture the term is applied to any circular or oval, and sometimes square tablet, bearing on it objects represented in relief, as figures, heads, animals, flowers, etc.

MEDALS. See Numismatics.

MEDE'A, in Greek mythology, daughter of Æetes, king of Colchis, on the eastern coast of the Black Sea. She enabled Jason to obtain the celebrated golden fleece and lived with him for ten years, until he discarded her in favor of Glauce or Creusa, daughter of King Creon. In revenge she sent Glauce a bridal robe which enveloped her in consuming flame, and thereafter she slew her own children by Jason. There are many versions of this Greek myth, and it has been a favorite theme with painter and dramatist. Euripides has a well-known tragedy of this name.

MEDFORD, a city in Middlesex co., Mass., five miles north by west of Boston; on the Mystic river, and on the southern and western divisions of the Boston and Maine railroad. Pop. 21,280.

MEDIA, an ancient country in Western Asia, formerly the seat of a powerful kingdom, corresponding nearly to the northwestern portion of modern Persia. The Medes and Persians, from their near resemblance to each other, appear to have amalgamated readily after the conquest or revolution which gave the ascendancy to the latter. Media henceforward formed part of the Persian Empire, and shared its fate.

MEDIATIZATION, the term applied to the annexation of the smaller German sovereignties to larger contiguous states, which took place on a large scale after the dissolution of the German Empire in 1806.

MEDICAL JURISPRUDENCE. See Forensic Medicine.

MEDICI (mā'di-chē), a Florentine family who rose to wealth and influence by successful commerce, and who continued to combine the career of merchants and bankers with the exercise of political power, a princely display of private munificence, and a liberal patronage of literature and art. The Medici were associated with the history of the

Florentine republic from an early period, but they first became prominent in the person of Salvestro, who became gonfalonier in 1378. Giovanni de' Medici (1360-1429) amassed great riches by trade; rendered great services to the city and in 1421 became gonfalonier. He was succeeded by his son Cosmo (the elder, 1389-1464), surnamed the father of his country. Cosmo acquired immense wealth and influence, and laid



Cosmo de' Medici.

the foundation of his reputation by the munificent patronage of art and letters, and the conjunction of consummate statesmanship with his commercial enterprise. He was for thirty-four years the sole arbitrator of the republic and the adviser of the sovereign houses of Italy. His grandson Lorenzo the Magnificent (1449-92) was the second great man of the house of Medici. He governed the state in conjunction with his brother Giuliano (1453-78) till the latter was assassinated by the Pazzi, a rival Florentine family. Escaping from this massacre he sustained a war with Ferdinand of Naples, with whom he signed a definite peace in 1480. The rest of Lorenzo's reign was passed in peace and in those acts of profuse liberality and magnificent patronage of arts and sciences, in which he rivaled or excelled his grandfather. He left three sons—Piero (1471-1503), Giovanni (afterward Pope Leo X.), and Giuliano, duke of Nemours. Piero succeeded his father, but was deprived of his estates when the French invaded Italy in 1494. He finished his career in the service of France. His eldest son Lorenzo came to power by the abdication of his uncle Giuliano, who became Duke of Urbino. He died in 1519, leaving a daughter, the famous Catherine de Medici, queen of France. After several reverses in the family Alessandro, an illegitimate son of the last named Lorenzo, was restored to Florence by the troops of Charles V., and by an imperial decree he was declared head of the republic, and afterward Duke of Florence. The next name of importance in the family is that of Cosmo "the great," in 1537 proclaimed Duke of Florence and afterward Grand-duke of Tuscany. A learned man himself, he was a great patron of learning

and art, a collector of paintings and antiquities. He died in 1574. Francisco Maria, his son, obtained from the Emperor Maximilian II., whose daughter Joanna he had married, the confirmation of his title of grand-duke in 1575 which continued in his family until it became extinct in 1737 on the death of Giovanni Gasto, who was succeeded by Francis, duke of Lorraine. See Tuscany, Catherine de Medici, Marie de Medici.

MEDICINE, the science of diseases, and the art of preventing, healing, or alleviating them. It deals with the facts of disease, with the remedies appropriate to various diseases, with the results of accident or injury to the human body, with the causes that affect the origin and spread of diseases, and with the general laws that regulate the health of individuals and the health of communities. It is broadly divided into two great sections, surgery (which see) and medicine proper; that is to say, the diseases affecting the outer frame visible to the eye are relegated to the care of the surgeon, while those that affect the internal organs belong to the province of the physician. A department related to both is obstetric medicine or midwifery, dealing with child-bearing and with the diseases peculiar to women. With this department is closely connected that which comprehends the diseases of children. There are also departments dealing with special organs, such as those relating to diseases of the eye, of the ear, of the throat, of the skin, etc., each of which occupies its own domain of knowledge, and is represented by highly-trained specialists. The treatment of the insane, as it is concerned with nervous diseases and correlated states of other organs, is an integral part of medical practice. War also has given rise to special developments of medical and surgical science, viz.: military hygiene and military surgery; and the administration of the law has created a special branch—medical jurisprudence or forensic medicine.

At first all diseases, in common with other phenomena, were attributed to supernatural causes, and the direct doings of unseen beings; and had to be exorcised by ceremonies, prayers, and adjurations. In course of time it was recognized that diseases were natural phenomena, but at the same time each was held to be a principle or entity distinct from its effects, and each disease was supposed to have a specific remedy—something that would actually cure the disease. Such views led to the adoption of various systems of treatment. For instance, one school held that only vegetable remedies were appropriate to the treatment of diseases; another school upheld the hydropathic system, or the virtues of the bath in one or other of its forms as a universal panacea for all human ills. A third maintained the application of the homœopathic principle that similars are cured by similars that is to say, diseases are cured by substances having, in small doses, an action on the body similar to that of the disease, so that one might treat diseases by a series of fixed and specific formulæ all depending on this single principle.

Finally, even in orthodox medical circles there is a strong disposition to attribute success of treatment to particular drugs, and to simply act on a principle contrary to that of homœopathy, viz.: that diseases are cured by contraries, that is, by remedies having an action on the body the reverse of that of the disease. All these opinions depend on a mistaken view of disease. Anything that interferes with the free and healthy action of any part of the body produces a state of disease, and the symptoms of the disturbance manifest the disease. For instance, in the case of zymotic diseases, they are caused by the entrance into the body of living germs which grow and multiply in the blood and tissues, and interfere with the various organs. These germs are, however, not the disease, but the cause of the disease. Again many diseases are due not to something that has entered the body, but to a breaking down of a certain part of the system. It is clear, therefore, that no specific remedies can be applied to such diseases. The object of the physician is to restore as far as possible the conditions of healthy action: to remove if he can the causes of the disease, to relieve pain, and to control symptoms so as to direct them toward recovery.

The chief departments of medical science may be given as follows: The science of health is called hygiene, or as far as it relates to the regulation of the diet, dietetics. Pathology is the science of disease, of that in which it consists, its origin, etc. Nosology treats of the various sorts of diseases, their origin and symptoms, and strives to arrange diseases according to a scientific classification. Pathological anatomy deals with the mechanical alterations and changes of structure. Therapeutics is the science of the cure of diseases, often divided into general, treating of the subject of cure in general, its character, etc.; and special, of the cures of the particular diseases. Surgery treats of external diseases and injuries, and the mode of relieving derangements by operative means. Obstetrics treats of the modes of facilitating delivery. *Materia medica* is the science of medicines, their external appearance, history, and effects on the human organization. Pharmacy teaches how to preserve drugs, etc., and to mix medicines. Clinics applies the results of all these sciences at the bedside of the patient. (See the various medical articles under separate heads.) Among names famous in the history of medicine, may be mentioned Hippocrates, the father of medicine; Celsus, Galen, Avicenna, Paracelsus, Vesalius, Van Helmont, Sylvius, Stahl, Harvey, Sydenham, Boerhaave, Hoffman, Cullen, Brown, Hahnemann, etc. There are various statutes having direct relation to medicine: they may be divided into four groups (1) those related to public health; (2) those relating to lunacy (and habitual drunkenness); (3) those relating to the status of the medical profession, to dentists, and to pharmaceutical chemists; (4) those relating to restrictions on the practice of anatomy and physiology. See also Surgery.

MEDITERRANEAN SEA, the great inland sea between Europe, Asia, and Africa, about 2200 miles long and 1200 in extreme breadth. It communicates on the west with the Atlantic Ocean by the Strait of Gibraltar, and on the north-east with the Black Sea through the Sea of Marmara and the Straits of the Dardanelles and Constantinople. The

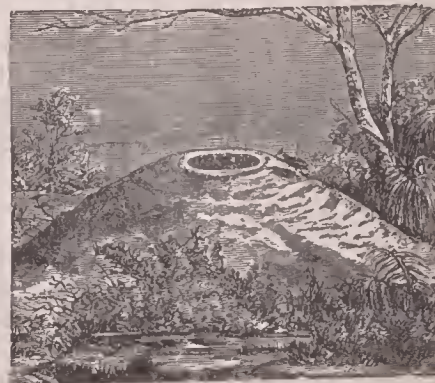


principal rivers which discharge themselves directly into the Mediterranean are the Ebro, Rhône, Po, and Nile. The depth varies from 30 to 2150 fathoms. Owing to the very narrow channel which connects the Mediterranean with the main ocean, there is very little tide; though on parts of the African coast, etc., a rise of more than 6 feet sometimes occurs.

MEERSCHAUM (mēr-shum), a hydrated silicate of magnesium, consisting of 60.9 parts silica, 26.1 magnesium, and 12.0 water, occurring as a fine white compact clay. It is found in Europe, but more abundantly in Asia Minor, and is manufactured into tobacco-pipes.

MEERUT', or **MIRAT'**, a city, cantonment, and administrative center of the United Provinces, India. Pop. 118,129. The district of the same name occupies an area of 2379 sq. miles. Pop. 1,391,458.

MEGAPODIUS, a genus of rasorial birds, type of the family Megapodidae, the best known and most remarkable species of which is the Australian junglefowl, a large bird remarkable for erecting considerable mounds, composed of earth, grass, decayed leaves, etc., sometimes 15 feet high and 150 in circum-



Nest of megapodius.

ference, and in the center of which, at a depth of 2 or 3 feet, it deposits its eggs, leaving them to be hatched by the heat of the fermenting vegetable mass.

MEGAPHONE, a speaking-trumpet used to render the voice audible at considerable distances. It consists of a large funnel of tin or papier-maché, in which the sound-waves are so reflected that they issue from its mouth in approximately parallel directions. The size and shape of the megaphone are so regulated that the usual tones of the voice undergo the largest possible amount of strengthening. For this reason a megaphone to be used with the best effect by a woman would be different in size from that suited to the deeper notes of a man's voice. The megaphone has succeeded the old speaking-trumpet for use at sea, and is generally employed by naval officers and mariners for communicating with the shore or with a distant vessel.

MEGAP'TERA, a genus of whales of the family Balænidæ, including the hump-backed whales.

MEGATHERIUM, a fossil genus of edentate mammals, allied to the sloths, but having feet adapted for walking on the ground, found in the upper Tertiary or pampas deposits of South America. It was about 8 feet high, and its body 12



Megatherium restored.

to 18 feet long. Its teeth prove that it lived on vegetables, and its fore-feet, about a yard in length and armed with gigantic claws, show that roots were its chief objects of search.

MEHEM'ET ALI, Viceroy of Egypt, born at Kavala, in Macedonia, in 1769, died 1849. He entered the Turkish army, and served in Egypt against the French; rose rapidly in military and political importance; became pasha of Cairo, Alexandria, and subsequently of all Egypt. In 1811 he massacred the Mamelukes to the number of 470 in Cairo, and about 1200 over the country. By means of a vigorous domestic policy Mehemet reduced the finances to order; organized an army and a navy; stimulated agriculture, and encouraged manufactures. In 1824-27 he assisted the sultan in endeavoring to reduce the Morea, which led to the destruction of his fleet by the allied European powers at Navarino (1827). Subsequently he turned his armies against the sultan, and in his efforts to secure dominion over Syria by armed invasion, he was so far successful (see Ibrahim Pasha) that the European powers had to interfere and compel him to sign a treaty in 1839, which gave him the hereditary pashalic of Egypt in lieu of Syria, Candia and Hejaz. In his latter days he sank into dotage.

MEISSONIER (mā-son-yā), Jean Louis Ernest, French painter, born in Lyons 1815; went to Paris in 1830; first picture exhibited, *The Visitors*, 1834. He first became known as an illustrator of books, but rapidly became famous for the singular perfection of his art. His pictures, which, whether in genre or in portraiture, are almost without exception upon a small scale, are characterized by great minuteness of execu-



J. L. E. Meissonier.

tion and high finish, but are at the same time not less remarkable for their excellence in composition and breadth of treatment. They have the force of appeal of large works. Among his pictures, which possess an astonishing market value, may be mentioned, *The Smoker* (1839); *La Partie des Boules* (1848); *Napoleon III, at Solferino* (1864); *the Cavalry Charge* (1867), sold for 150,000 francs; the picture entitled "1807" (1875), representing Napoleon I, in the battle of Friedland, sold for 300,000 francs; *Le Guide* (1883); *Jena* (1889). He died in 1891.

MELANCHOLIA, Melancholy. See Insanity.

MELANCHTHON (me-langk'thon), Philip, German reformer, born at Bretten, in the Palatinate, 1497; died at Wittenberg, 1560. In 1518, at the instigation of Luther and Reuchlin, he was invited by Frederick, elector of Saxony, to fill the chair of Greek in the recently founded University of Wittenberg. In 1519 he accompanied Luther to Leipzig, in order to dispute with Dr. Eck, and in 1521 he published his famous *Loci Communes*, an exposition of Protestant dogmatics, which ran through some sixty editions in his lifetime, and was followed by other influential writings, such as the *Epitome Doctrinæ Christianæ* (1524).

MEL'ANITE, a lime-iron variety of garnet, of a velvet black or grayish black, occurring always in crystals of a dodecahedral form. See Garnet.

MELBOURNE, a city of Australia, capital of the colony of Victoria. Melbourne was founded in 1836 during the premiership of Lord Melbourne, after whom it was named. It was incorporated in August, 1842, and in 1849 erected into an episcopal see. The public buildings of Melbourne as a whole are handsome and substantial. Among them the most remarkable are the houses of parliament, the treasury, the law-courts, the free library, containing over 200,000 volumes; the mint, the university, with an admirable museum attached. The

chief industrial products are leather, clothing, furniture, flour, ales, cigars,



ironware, woollens, etc. Population of city proper, 66,391; inclusive of suburbs, 493,956.

MELODEON, the early American organ, in which an exhaust or suction bellows draws the air inward through the reeds. The supply of wind for the reeds is obtained by means of a pair of treadles, worked by the performer, and the reeds themselves are controlled by stops and slider mechanism. The tone of the instrument has been steadily improved, and now successfully imitates a number of orchestral instruments.

MELODRAMA, originally and strictly that species of drama in which the declamation of certain passages is interrupted by music, but now the term has come to designate a romantic play, generally of a serious character, in which effect is sought by startling incidents, striking situations, and exaggerated sentiment, aided often by splendid decoration and music.

MELODY, in the most general sense of the word any successive connection or series of tones; in a narrower sense, a series of tones which please the ear by their succession and variety; and in a still narrower sense, the particular air or tune of a musical piece.

MELON, a well known plant and fruit. It is an herbaceous, succulent, climbing or trailing annual, cultivated for its fruit in hot eastern countries from time immemorial. There are many varieties,



Melon.

as the Cantaloupe, which is reckoned the best. The water-melon is much cultivated in the warmer parts of the world on account of its refreshing juice, which, however, is less sweet than that of the common melon.

MELOS, now **MILOS** or **MILO**, an island belonging to Greece, in the Grecian Archipelago. In 1820 a peasant discovered here the celebrated statue known as the Venus of Milo, now placed in the museum of the Louvre at Paris.

MELROSE, a city in Middlesex co., Mass., on the Boston and Maine railroad; 7 miles n. of Boston. Pop. 15,160.

MELTING-POINT. See Fusing-point.

MELVILLE, George Wallace, American naval engineer, was born in New York City in 1841. He entered the United States navy as an engineer in 1861. Among his contributions to the building up of the new navy are his designs for the triple screw machinery for the two cruisers Columbia and Minneapolis. Melville sailed in 1879 under Lieutenant De Long on the ill-fated Jeannette expedition to discover a northeast passage across the Polar Sea. After the loss of the Jeannette he brought to safety the crew of his own boat, and subsequently conducted the search which discovered the Jeannette records and the bodies of De Long and his companions. He was afterward a member of the Greely Relief Expedition (1884). He was appointed chief engineer in 1881, engineer-in-chief in 1887, and rear-admiral in 1899. He is the author of "In the Lena Delta."

MELVILLE ISLAND.—1. An island in the Polar Sea, north of America. Captain Parry discovered it, and passed the winter of 1819–20 there. 2. An island off the north coast of Australia; area, about 1800 sq. miles.

MEMBRANE, in anatomy, a texture of the animal body, arranged in the form of laminae, which covers organs, lines the interior of cavities, or takes part in the formation of the walls of canals or tubes. Membrane is generally divided into three kinds, mucous, serous and fibrous. The lining of the nose, trachea, œsophagus, stomach, intestines, is of the first kind; the serous membranes form the lining of the sacs or closed cavities, as of the chest, abdomen, etc.; the fibrous membranes are tough, inelastic, and tendinous, such as the dura mater, the pericardium, the capsules of joints.

MEMNON, a mythological personage mentioned in the Homeric poems as the beautiful son of Eös (the morning), and in the post-Homeric accounts as the son of Tithonus and nephew of Priam, whom he assisted at the siege of Troy. He slew Antilochus, but was himself slain by Achilles. His mother was filled with grief at his death, which Zeus endeavored to soothe by making her son immortal. The name of Memnon was latterly connected with Egypt, and was attached to a statue still standing at Thebes, being one of two known from their size as "the Colossi." This statue known as "the vocal Memnon," was celebrated in antiquity as emitting a sound every morning at the rising of the sun—perhaps through the craft of the priests, though some think it was owing to expansion caused by heat. Both statues seem originally to have been about 70 feet high.

MEMORY, the power or the capacity of having what was once present to the

senses or the understanding suggested again to the mind, accompanied by a distinct consciousness that it has formerly been present to it; or the faculty of the mind by which it retains the knowledge of past events, or ideas which are past. The word memory is not employed uniformly in the same precise sense, but it always expresses some modification of that faculty which enables us to treasure up and preserve for future use the knowledge which we acquire; a faculty which is obviously the great foundation of all intellectual improvement. The word memory is sometimes used to express a capacity of retaining knowledge, and sometimes a power of recalling it to our thoughts when we have occasion to apply it to use, the latter being more correctly called recollection. See Mnemonics.

MEMPHIS, an ancient city of Egypt on the left bank of the Nile, some 20 miles south of Cairo, said to have been founded by Menes, the first king of Egypt. It was a large, rich, splendid city, and after the fall of Thebes, the capital of Egypt. At the time of the conquest of Egypt by Cambyses (524 B.C.) it was the chief commercial center of the country, and was connected by canals with the Lakes of Mœris and Mareotis. With the rise of Alexandria the importance of Memphis declined, and it was finally destroyed by the Arabs in the 7th century. The pyramids of Sakkara and the colossal statue of Rameses II., now mutilated and thrown down, are the chief objects of antiquarian interest on the site.

MEMPHIS, a city and port in Tennessee, on the Mississippi, just below the junction of Wolf river, 209 miles w.s.w. of Nashville. It stands upon a bluff about 30 feet above the river in its highest floods, and is fronted by a fine esplanade. Its rapid growth is due to its favorable position for trade, which is largely carried on by rail and river, chiefly in cotton. Pop. 1909, about 175,000.

MENA'DO, the capital of a Dutch residency of same name in the northeast peninsula of Celebes. The town itself has a population of about 6000, while the inhabitants of the whole territory number about 500,000.

MENDELSSOHN-BARTHOLDY, Felix, distinguished composer, born at Hamburg, 1809, died at Leipzig, 1847. He was the son of a wealthy Jew, who, recognizing his son's talent for music, had him carefully trained. In his ninth year he publicly appeared in Berlin as a musician, and in his sixteenth year he produced the well-known overture to the Midsummer Night's Dream. In 1829 he began an extensive tour through England, Scotland, France, Italy, and on his return to Germany he became musical director in Düsseldorf. Here he tried to establish a theater but without success; and when he left that city in 1835 he became conductor of the famous concerts in the Gewandhaus of Leipzig—a position which he maintained with several slight interruptions until his death. In 1841 he was appointed musical director to the King of Saxony; was afterward summoned to Berlin by the King of Prussia to become

director of music at the Academy of Arts; and journeyed repeatedly to England, where he conducted his own music at London and Birmingham. Of his musical compositions the best known are the oratorios Elijah and St. Paul; the overture to Ruy Blas; and his Songs without Words. He left unfinished the oratorio of Christus and the opera of Loriei.

MENDICANT ORDERS. See Orders (Religious).

MENDOZA, a province of the Argentine Republic, on the eastern side of the Andes, area, about 34,000 sq. miles. The country is volcanic, the soil fertile but requiring irrigation; chief products: corn, wine, and fruits. Pop. 141,431.—The capital, which has the same name, is situated about 2891 feet above the sea at the foot of the Cordilleras. It was almost totally destroyed by an earthquake in 1861, over 13,000 lives being lost, but has been rebuilt, and has now about 29,500 inhabitants.

MENELA'US, in Greek mythology, son of Atreus, brother of Agamemnon, and husband of the beautiful Helen, with whom he received the kingdom of Sparta or Lacedæmon. His wife having been abducted by Paris, son of Priam, king of Troy, he summoned the Greek princes to avenge the affront, and himself led sixty ships to the siege of Troy. After its conquest he returned with Helen to his native land in a devious voyage which led him to Cypria, Phœnicia, Egypt, and Libya during a period of eight years.

MENES, or **MENA**, according to Egyptian traditions, the first king of Egypt. See Egypt.

MENINGITIS (-jī'tis), the term applied to inflammation of the two inner membranes (meninges) which envelop the brain—the arachnoid membrane and the pia mater. There are two forms of this disease called simple and tubercular. The former may be caused by injuries of the head, exposure to cold or heat, disease of the ear, etc., and the symptoms are, pain in the head, giddiness, feverishness, and often vomiting; while the latter is frequently due to a scrofulous taint, and is also called acute hydrocephalus or water in the head.

MENNO, Simons, the founder of the sect known as the Mennonites, was born in Friesland 1496, died 1561. He was educated for the church, and became a Roman Catholic priest; but about 1510 he joined the Anabaptists. After the suppression of the disturbances at Münster Menno collected the scattered remnants of the sect, inculcated on them more moderate views, and for many years in Holland and the north of Germany, as far as Livonia, labored to increase the number of his followers, and to disseminate his doctrines. In this he was not unsuccessful, and there are still a number of congregations in Holland, Germany, and Russia who pass under the name of Mennonites. These do not believe in original sin, and object to taking oaths, making war, or going to law. The Mennonites are also found in the United States, where they number about 200,000. See Anabaptists.

MENNONITES. See above article.

MENOMINEE, the capital of, Menominee co., Mich., on Green Bay, at the mouth of the Menominee river, and on the Chi., Mil. and St. Paul and the Chi. and N. W. railways; 52 miles n.e. of Green Bay. It has numerous saw-mills, and is an important lumber shipping-point. Pop. 15,710.

MENSCHIKOFF, ALEXANDER, Danilovitch, Russian minister, born at Moscow in 1672, died 1729. He was born in humble life, but ultimately became a prince of the empire and first favorite with Peter the Great. When that monarch died his power under Catherine I. was greatly increased. After two years she was succeeded by her grandson, Peter II., who came under the guardianship of Menschikoff, and to whom he endeavored to marry his daughter. His designs, however, were frustrated by the combined efforts of the Dolgorukis and the young czar, and Menschikoff was exiled to Siberia, where he died.

MENSTRUATION, or **MENSES**, the periodical discharge of blood from the generative organs of the human female. The period at which menstruation begins is usually between the 14th and 16th year; it recurs at monthly intervals, lasting for four to six days, and thus continues until from the 45th to the 50th year; the discharge at each period is from 6 to 8 oz. All these conditions, however, vary with each individual. A discontinuance of this discharge is one of the first signs of conception, and the cessation usually continues during the period of pregnancy and lactation.

MENSURATION is the practical application of the simpler processes of mathematics to the measurement of the area of a plane figure, or the volume of a solid, the result being expressed in square or cubic inches, feet, yards, etc. The area of any plane rectilinear figure is easily found, since it can always be divided into a certain number of triangles and the area of every triangle is equal to the base multiplied by half the perpendicular height. If the figure is a parallelogram its area is equal to any side multiplied by the perpendicular distance from this side to the opposite; if a trapezium it is equal to half the sum of two opposite sides multiplied by the perpendicular distance between them. Circumference of a circle = diameter multiplied by 3.14159. Area of a circle = square of radius multiplied by 3.14159 = radius multiplied by half circumference. Volume of any rectangular solid = length, breadth, and depth multiplied together.

MENTAL DERANGEMENT. See Insanity.

MENTAL PHILOSOPHY. See Mind, Metaphysics, Psychology.

MENTHOL, a white crystalline substance obtained from oil of peppermint of which it smells strongly, used externally in cases of nervous headache.

MENTZ. See Mainz.

MENU. See Manu.

MEPHISTOPH'ELES, older forms Mephistophilus, Mephistophilis, the name of a demon in the old puppet-plays, adopted and developed by Marlowe in his tragical history of Dr. Faustus, and more especially by Goethe in the

first part of Faust, where he becomes the cultured personification of evil rather than the Satan of popular belief.

MERCANTILE LAW. See Commercial Law.

MERCA'TOR, Gerard, geographer, born at Rupelmonde, in Flanders, 1512; died 1594. He studied at Louvain; became a lecturer on geography and astronomy; entered into the service of Charles V., for whom he made a celestial and a terrestrial globe; and in 1559 he retired to Duisburg as cosmographer to the Duke of Juliers. He is the author of a method of projection called by his name (see next article), the principles of which were applied practically by Edward Wright, in 1599. He is also the author of *Tabulæ Geographicæ* (Cologne, 1578).

MERCATOR'S PROJECTION, a method of projection used in map-making in which the meridians and parallels of latitude cut each other at right angles, and are both represented by straight lines. By means of this projection seamen are enabled to steer by compass in straight lines, and not in the spiral necessitated by the other projections. It is constructed as follows: A line of any length is drawn to represent the equator. This line is divided into 36 or 18 equal parts for meridians at 10° or 20° apart, and the meridians are then drawn through these perpendicular to the equator. From a table of meridional parts take the distances of the parallels and of the tropics and arctic circles from the equator, marking them off above and below it. Join these points, and the projection is complete.

MERCIER, Honoré, Canadian politician, born 1840. He studied law, and has been engaged in journalism. He sat in the Dominion parliament from 1872 till 1874, and became solicitor-general in the legislative assembly of Quebec in 1879, and attorney-general in 1887.

MERCURY, in mythology, the name of a Roman divinity, identified in later times with the Greek Hermēs. As representing Hermēs he was regarded as the son of Jupiter and Maia, and was looked upon as the god of eloquence, of commerce, and of robbers. He was also the messenger, herald, and ambassador of Jupiter. As a Roman divinity he was merely the patron of commerce and gain. See Hermēs.

MERCURY, in astronomy, the planet nearest the sun. He moves round the sun in 87.9693 of our mean solar days, at a mean distance of 35,392,000 miles; his eccentricity of orbit is 0.205618; the inclination of his orbit to the ecliptic is 70° 0' 8".2, his diameter about 3050 miles. The period of his axial rotation is the same as that of his revolution round the sun. His volume is about $\frac{1}{17}$ that of the earth; his density $\frac{1}{10}$ greater than the earth's. He is visible to the naked eye in the spring and autumn after sunset and before sunrise. Transits of Mercury over the sun's disc take place at intervals of 13, 7, 10, 3, 10, 3, etc., years.

MERCURY, called also quicksilver, a metal whose specific gravity is greater than that of any other metal, except the platinum metals, gold, and tungsten, being 13.56, or thirteen times and a half

heavier than water. It is the only metal which is liquid at common temperatures. It freezes at a temperature of 39° or 40° below the zero of Fahrenheit, that is, at a temperature of 71° or 72° below the freezing point of water. Under a heat of 660° it rises in fumes, and is gradually converted into a red oxide. Mercury is used in barometers to ascertain the weight of the atmosphere, and in thermometers to determine the temperature of the air, for which purpose it is well adapted by its expansibility, and the extensive range between its freezing and boiling points. Preparations of this metal are among the most powerful poisons, and are extensively used as medicines. The preparation called calomel or mercurious chloride is a most efficacious deobstruent. Another valuable preparation is corrosive sublimate or mercuric chloride. From the fluid state in which mercury exists it readily combines with most of the metals, to which, if in sufficient quantity, it imparts a degree of fusibility or softness. An alloy of mercury and any other metal is termed an amalgam. Mercury is chiefly found in the state of sulphide, but it is also found native. The chief mines of mercury are in Spain, but it is also found in Germany, Italy, China, California, Borneo, Mexico, and Peru.

MERCY, Sisters of, the name given to members of female religious communities founded for the purpose of nursing the sick at their own homes, visiting prisoners, attending lying-in hospitals, superintending the education of females, and the performance of similar works of charity and mercy. Communities of Sisters of Mercy are now widely distributed over Europe and America, some of them being connected with the Church of England.

MEREDITH, George, poet and novelist, born 1828 in Hampshire; studied for the law, but essayed a literary career with a volume of poems in 1851. This was followed by others, among them the following: *Farina*, a Legend of Cologne; *The Ordeal of Richard Feverel*; *Poems and Ballads*; *The Egoist*; *Diana of the Crossways*; *Ballads and Poems of Tragic Life*; *The Amazing Marriage*.

MERGAN'SER, a genus of aquatic birds belonging to the duck family.



Red-breasted merganser.

They inhabit lakes and the sea-coast, migrate southward in winter, lay from eight to fourteen eggs, and are gregarious in habit.

MERIDEN, a town in Connecticut, 18 miles n.e. of New Haven. It is largely engaged in the manufacture of iron-castings, tinware, cutlery, brass-work, glass, woolen goods, and plated ware. It contains a state reformatory. Pop. 29,296.

MERIDIAN, one of the innumerable imaginary lines on the surface of the earth, that may be conceived of as passing through both poles and through any other given place, and serving to settle the longitude of places and thus to mark their exact position. There are also corresponding lines called astronomical or celestial meridians, which are imaginary circles of the celestial sphere passing through the poles of the heavens and the zenith of any place on the earth's surface. Every place on the globe has its meridian, and when the sun arrives at this line it is noon or mid-day, whence the name (Latin *meridianus*—*medius*, middle, and *dies*, day). The longitude of a place is its distance—usually stated in degrees, minutes, and seconds—east, or west of any meridian selected as a starting-point, just as its latitude is its distance north or south of the equator. In Britain it has long been the custom to count from the meridian of Greenwich as a starting-point; this meridian being called the first meridian, and the longitude of Greenwich being marked 0 or nothing. Other countries, however, had selected their own meridian, with the result that confusion arose among geographers and navigators in localizing any given place. This difficulty was discussed at a national conference held at Washington October, 1884, and at last Greenwich was selected as the geographical and astronomical reference meridian of the world, longitude to be reckoned east and west from this up to 180°. It was also arranged that the astronomical day should begin at midnight, 1st January, 1885, so that astronomers henceforth have one definite day over all the world. See also *Longitude*, *Day*.

MERIDIAN, the capital of Lauderdale co., Miss., on the E. Tenn., Va. and Ga., the Mobile and Ohio, and the Queen and Cresc. railways, 85 miles e. of Jackson, 135 miles n. by w. of Mobile, Ala. It is in an agricultural region, chiefly producing cotton. Pop. 16,210.

MERIDIAN CIRCLE, a mural circle or transit circle.

MERINO (me-rē'nō), a twilled woolen tissue, dyed various colors, and often also printed. In the better kind of goods both the warp and the woof are of carded woolen yarn, but in inferior sorts the warp is of cotton.

MERINO SHEEP, a variety of sheep originally peculiar to Spain, but now



Head of Merino ram, before and after shearing.

reared in other parts of Europe, in Australia, New Zealand, etc. They are

raised chiefly for the sake of their long fine wool, the mutton being but little esteemed.

MERLIN, a legendary Welsh prophet and magician, who is said to have lived in the 5th century. He is said to have been the offspring of a demon and a Welsh princess, and became adviser to the English kings Vortigern, Ambrosius, Utherpendragon, and Arthur. There was also a prophet connected with the ancient kingdom of Strathclyde called Merlin the Wild, or Merlinus Caledonius, who is said to have lived in the 6th century. His prophecies, containing also those ascribed to the Welsh Merlin, were published at Edinburgh in 1615.

MERLIN, the smallest of the British falcons, being only about the size of a black-bird, but very bold. It was formerly used in hawking quails, partridges, larks, and such small game, and is even yet occasionally trained. It is of a bluish ash color above; reddish yellow on the breast and belly, with longitudinal dark spots, the throat of the adult male white. It builds its nest on the ground.

MERMAID AND MERMAN, were legendary creatures who lived in the sea, possessed a human body united to the tail of a fish, and who were supposed capable of entering into social relationships with men and women. Under various names they were known over Northern Europe, the typical mermaid being a lovely creature who combs her long beautiful hair with one hand while she holds a looking-glass with the other. The origin of this myth is supposed to rest in the human-like appearance of certain aquatic animals, such as the seal. The legends of mermaids and mermen have been largely treated in poetry.

MERRIMAC, a river of the United States in New Hampshire and Massachusetts. The immense water-power furnished by its falls has created the towns of Lowell and Lawrence in Massachusetts, and of Nashua and Manchester in New Hampshire.

MERSEY, an important river of England, expands into an estuary 17 miles from its mouth at Runcorn; and its entire length is 60 miles. The principal towns on its banks are Warrington, Stockport, Birkenhead, and Liverpool. The Manchester Ship Canal comprises part of the channel of the Mersey.

MERSEY TUNNEL, opened in 1886, connects Liverpool and Birkenhead by a railway under the river Mersey. It is 21 feet high, 26 feet wide, and 31 feet below the bed of the river; is 4½ miles long with the approaches, and is ventilated by means of large fans and a small tunnel which runs alongside. The cost of construction is stated to have been \$6,250,000.

MERTHYR-TYDVIL, a parliamentary borough of South Wales, county of Glamorgan, 24 miles n.n.w. of Cardiff, on the Taff. Pop. (which includes Aberdare), 122,536; of town, 69,227.

MESMER, Friedrich Anton, German physician, founder of the doctrine of mesmerism or animal magnetism, was born in 1733, died in 1815. He professed to cure diseases by stroking with magnets, but about 1776 he renounced their use, and declared that his operations were

conducted solely by means of the magnetism peculiar to animal bodies. (See *Mesmerism*.) He went to Paris in 1778, where he achieved considerable success and fame and made many converts to his views, but was regarded by the medical faculty as a charlatan. The government at length appointed a committee of physicians and members of the Academy of Sciences to investigate his pretensions. The report was unfavorable, and the system fell into disrepute. Mesmer retired to Swabia, where he died.

MESMERISM, Animal Magnetism (electro-biology, hypnotism), terms applied to certain peculiar nervous conditions which may be artificially induced, and in which the mind and body of one individual may be peculiarly influenced by another apparently independently of his own will. The term mesmerism is derived from Mesmer (see preceding article), who professed to produce these conditions in others and to cure diseases by the influence of a mysterious occult force residing in himself. This force he called animal magnetism. He held that it pervaded the whole universe, and specially affected the nervous system. The phenomena were known from the earliest ages, when the priests of most of the ancient civilizations affected to cure diseases by the touch of the hand, or threw people into deep sleeps, induced dreams, and produced many of the effects now referred to as mesmerism. While the phenomena which Mesmer professed to produce were probably in many cases genuine his theory of animal magnetism rested on no proper scientific basis. He has been followed by many disciples, whose success in producing the mesmeric condition has left no doubt as to the reality of many of the phenomena of mesmerism; but modern scientific investigation, while not fully explaining all these, has shown that they are due to peculiar nervous conditions, and that it is unnecessary to presuppose any occult force to account for them. The means usually employed to produce the mesmeric condition are such as touching and stroking with the hands, according to rule (manipulation), breathing on the person, fixing the eyes on him, etc. It may also, it is said, be produced by causing the patient to stare at an object, especially a bright one, placed in such a position as to strain the eye, the effect being completed by a few passes of the hand over the face without touching it. In the condition thus induced the patient seems to be in a kind of sleep. The limbs will remain in any position in which they may be placed. By stroking the surface of the body the muscles adjacent may be rendered rigid as in a person suffering from catalepsy. Reason and memory are temporarily suspended, the will is paralyzed, and the subject is irresistibly impelled to act in accordance with suggestion, however absurd. He can be persuaded into any hallucination, such as that he is some one other than himself, or that he hears or sees, smells or tastes something which has no existence before him. As a therapeutic agent mesmerism has been successfully employed in cer-

tain forms of disease, especially in cases of nervous irritation and sleeplessness, and such diseases in general as have a nervous origin. It has been claimed also by professors of the art that the patient when in this condition can determine the nature of any disease from which he may be suffering and the means of its cure, that he can penetrate the mysteries of the future and hold communication with distant persons. But these last statements cannot be regarded as authenticated.

MESOPOTA'MIA, a name given by the Greeks to the extensive region inclosed by the Tigris and Euphrates, anciently associated with the Assyrian and Babylonian monarchies. Its Old Testament name is Aram Naharaim, or Padan Aram. The Greek title was probably not in use till after Alexander the Great invaded the east. This country is inhabited chiefly by Arabs, Kurds and Armenians. Many of them are nomadic, and their chief occupation is the grazing of cattle. Mesopotamia is now part of the Turkish Empire.

MESOZO'IC PERIOD, the term applied by geologists to the geological period between the Palæozoic and the Cainozoic. It is coextensive with the secondary formations, and includes the rocks of the Triassic, Oolitic, and Cretaceous groups.

MESQUITE, a small tree allied to the acacia, common in Mexico, Texas, and other of the western states. It yields a gum not much inferior to gum arabic; its seeds are eaten, and a drink is prepared from the mucilage of its pods. Another species has pods that are eaten by the Indians, being rich in saccharine matter. They are of a twisted form, hence the name "screw bean."

MESSALI'NA, Valeria, the third wife of the Roman emperor Claudius. She is notorious in history on account of her licentiousness and cruelty. She was murdered A. D. 48.

MESSA'NA. See Messina.

MESSE'NIA, a country of ancient Greece, in the southern part of the Peloponnesus. Messenia gives name to a monarchy in modern Greece, with an area of 1221 sq. miles, and a pop. of 119,327.

MESSI'AH, corresponding to the Greek Christos of the New Testament, that is, "anointed," has in the Old Testament several applications, as to the whole Jewish people, to the priests, to the kings ("the Lord's Anointed"), and even to Gentile kings, as persons who had been anointed with holy oil. The designation, however, owes its special importance to the application of it in the prophetic books of the Old Testament to an ideal holy king and deliverer whose advent they foretold. The whole of the prophetic pictures agreed in placing Jehovah in the central place of the desired kingship. These prophecies, which are called the Messianic prophecies, had at the time of our Lord come to be applied by the Jews to a temporal king who should free them from foreign oppression. They are affirmed by Jesus Christ and His apostles to apply to and be fulfilled in Him; and this is the belief of the Christian Church, by which he is

called "The Messiah." The rationalistic school of theologians assert that Jesus laid claim to the dignity either to meet the preconceptions of his countrymen, or because he felt that the truth which he taught was the real kingdom never to be destroyed which the God of Heaven was to set up.

MESSI'NA, the chief commercial town and seaport of Sicily, capital of the province and on the strait of the same name. Pop. 149,823, in 1908 when it was destroyed by earthquake. (See earthquake.)—The province of Messina has an area of 1768 sq. miles, and a pop. of 548,898.

MESSINA, Strait of, the strait which separates Sicily from Italy. It has a length of about 20 miles, and varies in width from 2 miles in the north to 11 miles in the south, is very deep, and has a strong tidal current.

MESTIZOS (mes-tē'zōs), people of mixed origin in countries where Spanish Europeans have settled and intermingled with the natives.

METALLURGY (met'al-ēr-ji), the art of working metals, comprehending the whole process of separating them from other matters in the ore, smelting, refining, etc.

METALS, elementary substances have been divided by chemists into two classes, metals and non-metals or metalloids, but these merge one into the other by gradations so imperceptible that it is impossible to frame a definition which will not either include some non-metallic bodies or exclude some metallic. The term metal is an ideal type, and is applied to those elementary substances which in the combination of physical characteristics which they present approach more or less nearly to it. The following are the chief characteristics of metals. They are opaque, having a peculiar luster connected with their opacity called metallic; insoluble in water; solid, except in one instance, at ordinary temperatures; generally fusible by heat; good conductors of heat and electricity; capable, when in the state of an oxide, of uniting with acids and forming salts; and have the property, when their compounds are submitted to electrolysis, of generally appearing at the negative pole of the battery. Many of the metals are also malleable, or susceptible of being beaten or rolled out into sheets or leaves, and some of them are extremely ductile or capable of being drawn out into wires of great fineness. They are sometimes found native or pure, but more generally combined with oxygen, sulphur, and some other elements, constituting ores. The great difference in the malleability of the metals gave rise to the old distinction of metals and semi-metals, which is now disregarded. The following—fifty-two in number—are the principal substances usually regarded as metals: aluminium, antimony, barium, beryllium, or glucinum, bismuth, cadmium, caesium, calcium, cerium, chromium, cobalt, columbium, or niobium, copper, didymium, erbium, gallium, germanium, gold, indium, iridium, iron, lanthanum, lead, lithium, magnesium, manganese, mercury, molybdenum, nickel, osmium,

palladium, platinum, potassium, rhodium, rubidium, ruthenium, scandium, silver, sodium, strontium, tantalum, tellurium, terbium, thallium, thorium, tin, titanium, tungsten, uranium, vanadium, yttrium, zinc, zirconium. Of these gold, silver, copper, tin, lead, zinc, platinum, iron, are the most malleable; gold, which possesses the quality in the greatest degree, being capable of being beaten into leaves $\frac{1}{1000}$ of a millimetre in thickness. The following, given in the order of their ductility, are the most ductile: platinum, silver, iron, copper, gold, aluminium, zinc, tin, lead, platinum wire having been obtained of not more than $\frac{1}{1000}$ of a millimetre in diameter. The majority of the useful metals are between seven and eight times heavier than an equal bulk of water; platinum, osmium, and iridium are more than twenty times heavier; while lithium, potassium, and sodium are lighter. The metals become liquid, or otherwise change their condition, at very various temperatures: platinum is hardly fusible at the highest temperature of a furnace; iron melts at a little lower temperature; and silver somewhat lower still; while potassium melts below the boiling-point of water, and becomes vapor at a red heat, and it and sodium may be moulded like wax at 16° C. (61° Fahr.). Mercury is liquid at ordinary temperatures, and freezes only at 39½° C. below zero (-39° Fahr.). Osmium and tellurium are also regarded by some as non-metals. All the metals, without exception, combine with oxygen, sulphur, and chlorine, forming oxides, sulphides, and chlorides, and many of them also combine with bromine, iodine, fluorine. Several of the later discovered metals exist in exceedingly minute quantities, and were detected only by spectrum analysis, and there is every likelihood that research in this direction will add to the present list of metals.

METAMOR'PHIC ROCKS, in geology, stratified or unstratified rocks of any age whose original texture has been altered and rendered less or more crystalline by subterranean heat, pressure, or chemical agency. The name is given more especially to the lowest and azoic, or non-fossiliferous, stratified rocks, consisting of crystalline chists, and embracing granitoid schist, gneiss, quartz-rock, mica-schist, and clay-slate, most of which were originally deposited from water and crystallized by subsequent agencies. They exhibit for the most part cleavage, crumpling, and foliation, and their lines of stratification are often indistinct or obliterated.

METAMOR'PHOSIS, any change of form, shape, or structure. In ancient mythology the term is applied to the transformations of human beings into inanimate objects, with which ancient fable abounds. In zoology it includes the alterations which an animal undergoes after its exclusion from the egg or ovum, and which alter extensively the general form and life of the individual. All the changes which are undergone by a butterfly in passing from the fecundated ovum to the imago, or perfect insect, constitute its development—each change, from ovum to larva, from larva

to pupa, and from pupa to imago, constituting a metamorphosis.

METAPHOR, a figure of speech founded on the resemblance which one object is supposed to bear, in some respect to another, and by which a word is transferred from an object to which it properly belongs to another in such a manner that a comparison is implied, though not formally expressed. It may be called a simile without any word expressing comparison. Thus, "that man is a fox," is a metaphor; but "that man is like a fox," is a simile. So we say, a man bridles his anger; beauty awakens love or tender passions; opposition fires courage.

METAPHYSICS, a word first applied to a certain group of the philosophical dissertations of Aristotle which were placed in a collection of his manuscripts after his treatise on physics. As since employed, it has had various significations, and latterly it has been understood as applying to the science which investigates the ultimate principles that underlie and are presupposed in all being and knowledge. In the part of the Aristotelian treatise alluded to the problems were concerned with the contemplation of being as being, and the attributes which belong to it as such. This implies that things in general must be divided into beings or things as they are, and into phenomena or things as they appear. In modern usage metaphysics is very frequently held as applying to the former division, that is to the ultimate grounds of being. To attain this end it takes into account the correlative of being, that is, knowledge, and of knowledge not as coming within the province of logic or of mental philosophy, but as it is in relation to being or objective reality. In this respect metaphysics is synonymous with ontology. The science has also been considered as synonymous with psychology, and to denote that branch of philosophy which investigates the faculties, operations, and laws of the human mind.

METAZOA (met-a-zō'a), one of the two great sections into which Huxley divides the animal kingdom, the other being the Protozoa. The lowest of the Metazoa are the Porifera or sponges. That portion of the Metazoa which possess a notochord, constitute the subkingdom Vertebrata; the rest are invertebrate.

METEMPSYCHOSIS, transmigration; the passage of the soul from one body to another. See Transmigration of the Soul.

METEOR, a name originally given to any atmospheric phenomenon; it is now more usually applied to the phenomena known as shooting-stars, falling-stars, fireballs, or bolides, aerolites, meteorolites, meteoric stones, etc. It is now generally believed that these phenomena are all of the same nature, and are due to the existence of a great number of bodies, some of them very small indeed, revolving round the sun, which, when they happen to pass through the earth's atmosphere, are heated by friction and become luminous. Under certain circumstances portions of these bodies reach the earth's surface, and these are

known as meteorites or meteoric stones. These stones consist of known chemical elements. They have this peculiarity, that whereas native iron is extremely rare among terrestrial minerals, it usually forms a component part in meteorites, and is known as meteoric iron. Exceptionally large showers of meteors appear in August and November every year, and the November showers exhibit a maximum brilliancy every 33 years. As to the connection of meteors with comets see Comets.

METEORIC IRON. See Iron (Native), and Meteor.

METEORIC STONES. See Meteor.

METEOROLOGY, the science or branch of knowledge that treats of atmospheric phenomena relating to weather and climate. The phenomena with which it deals and the instruments used in their observation are mainly these, viz.: temperature (thermometer), humidity (hygrometer), atmospheric pressure (barometer), wind (anemometer), rainfall (rain-gauge), and clouds. These phenomena are all referable to the action of the sun, and accordingly present variations depending upon locality (including the infinitely varied physical features of different places), the diurnal revolution of the earth upon its axis, and the annual revolution of the earth round the sun. It is the business of meteorology to examine the laws which regulate these variations. It pursues its inquiries in two directions, (1) with reference to the variations observed at different times in the same locality with the view of obtaining average results as to its climate—climatology, and (2) with reference to the variations observed in different localities at the same time with the view of arriving at the laws which regulate the changes in the weather—weather study. In the prosecution of this study observations are taken at the same hour of Greenwich time at a number of stations situated over a large extent of the earth's surface. These observations include readings of barometer, thermometer, hygrometer, rain-gauge, anemometer, etc., with non-instrumental observation of clouds. The results which indicate the phenomena existing at that hour at the several stations are tabulated, or registered, formed into weather charts, etc. These charts are made by putting down on a map readings taken at the same moment over a large tract of country, and joining by lines the points where the readings agree. Since the general use of the electric telegraph this branch has assumed great practical importance. By its means observations made at many distant places may be immediately communicated to one center, and men of science are thus enabled to forecast with considerable accuracy the weather which may be expected in certain districts. Such forecasts can be made with great accuracy in tropical and sub-tropical countries where the atmospheric conditions are very constant, and variations from the average are consequently easily observed. They are attended with much more difficulty in temperate countries. In the British Isles they are exceptionally difficult owing to the fact that

on the side from which nearly all weather changes come, namely, the west, the existence of the Atlantic Ocean renders telegraphic warning of changes of weather impossible. The fact that a storm is travelling eastward may be telegraphed from America, but there is always a chance of its being dissipated or deflected long before it reaches the coasts of Europe. It having been observed, however, that a storm is always preceded by a fall of the barometer, the tendency to fall is observed some time before the minimum depression occurs; the notice of this tendency, together with observations of the wind and motions of cirrus clouds, enables storm warnings to be sent from observatories to the Meteorological office established by government in London, whence they are telegraphed to the various parts of the United Kingdom. The further eastward we travel in Europe the easier does the forecasting of the weather become. In the United States, where the majority of storms rise in the district to the west of the Mississippi, and are thus capable of easy observation, great accuracy has been attained. In Great Britain, the United States, and most civilized countries, systems of weather forecasting have now been established since about the year 1860, the name of Admiral Fitzroy being associated with the early days of the system in England. The United Kingdom is now divided into eleven districts, and a forecast for each of these is issued twice a day. Weather disturbances are generally cyclonic or anti-cyclonic in character. In the U.S., where the majority of storms rise in the district to the west of the Mississippi, and are thus capable of easy observation, great accuracy has been attained. The Weather Bureau originated in 1870, as an attachment to the Signal Service Office of the War Department. In 1891 it was transferred by law to the Department of Agriculture, its functions being closely allied to that interest. Its forecasts of the coming weather seldom extend beyond twenty-four to thirty-six hours in advance, and are telegraphed and published twice daily. See Cyclone, Anti-cyclone, Climate, etc.

METHODISTS, a sect of Christians founded by John Wesley, so called from the fact that the name was applied to Wesley and his companions by their fellow-students at Oxford, on account of the exact regularity of their lives, and the strictness of their observance of religious duties. The religious movement which resulted in the foundation of this sect began at Oxford in 1729, the chief leaders besides John Wesley being his brother Charles and George Whitefield (see Wesley, Whitefield). The first general conference of the Methodists was held in 1744, and the Methodists were constituted a legally corporate body in 1784. Their doctrines are substantially those of the Church of England. The appointment of a minister of the body to any place is always for three years. There are in addition to the ordained ministers lay preachers, leaders, trustees, and stewards. The body is governed by an annual confer-

ence, having at its head a president and secretary, whose term of office lasts but for a year. In each district the ministers hold half-yearly meetings, the several chairmen being appointed by the conference. There are also quarterly circuit meetings of ministers and lay officers. The supreme legislative and judicial power is vested in the conference to which the half-yearly and quarterly district and circuit meetings are subordinated. The number of members at Wesley's death was 76,968; but the denomination has increased with such marvelous rapidity, that there are said to be in different parts of the world above 28,000,000 adherents. The Methodists are especially numerous in North America, forming numerically the leading denomination in the United States. The Methodist Episcopal Church is the oldest and leading Methodist body in America. Since 1845 it has been divided into two branches, the Methodists of the southern states forming what is called the Methodist Episcopal Church, South.

METH'YL, the name given to the hypothetical radical of methyl alcohol which is contained in wood spirit. It is analogous to ethyl in its chemical character.

METHYLATED SPIRIT, spirit of wine containing 10 per cent of wood naphtha, which contains a large proportion of methylic alcohol. The naphtha communicates a disagreeable flavor, which renders it unfit for drinking, and for this reason it is admitted duty free. It is of much use in the arts as a solvent, for preserving specimens, in manufacture of varnishes, for burning in spirit-lamps, etc.

METHYLIC ALCOHOL, alcohol obtained by the destructive distillation of wood.

METONIC CYCLE, METONIC YEAR, the cycle of the moon, or period of nineteen years, in which the lunations of the moon return to the same days of the month: discovered by Meton, an Athenian mathematician who flourished 432 B.C.

METRE, rhythmical arrangement of syllables into verses, stanzas, strophes, etc. See Rhythm, Verse.

METRE, Mètre, a French measure of length, equal to 39.37 English inches or 3.28 feet, the standard of linear measure, being the ten-millionth part of the distance from the equator to the North Pole, as ascertained by actual measurement of an arc of the meridian.

METRIC SYSTEM OF WEIGHTS AND MEASURES. See Decimal System.

METRIC SYSTEM SIMPLIFIED, THE, the following tables of the metric system of weights and measures have been simplified as much as possible by omitting such denominations as are not in practical, everyday use in the countries where the system is used exclusively.

TABLES OF THE SYSTEM.

Length.—The denominations in practical use are millimetres (mm.), centimetres (cm.), metres (m.), and kilometres (km.).

10 mm. = 1 cm.; 100 cm. = 1 m.; 1,000 m. = 1 km.

NOTE.—A decimetre is 10 cm.

Weight.—The denominations in use are grams (g.), kilos* (kg.), and tons (metric tons). 1,000 g. = 1 kg.; 1,000 kg. = 1 metric ton.

Capacity.—The denominations in use are cubic centimetres (c.c.) and litres (l.).

1,000 c.c. = 1 l. **NOTE.**—A hectolitre is 100 l. (seldom used).

Relation of capacity and weight to length. A cubic decimetre is a litre and a litre of water weighs a kilo.

APPROXIMATE EQUIVALENTS.

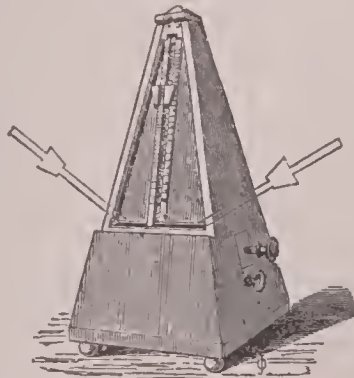
A metre is about a yard; a kilo is about 2 pounds; a litre is about a quart; a centimetre is about $\frac{1}{2}$ -inch; a metric ton is about same as a ton; a kilometre is about $\frac{1}{2}$ mile; a cubic centimetre is about a thimbleful; a nickel weighs about 5 grams.

PRECISE EQUIVALENTS.

1 acre.....	=	.40	hectar.....	.4047
1 bushel.....	=	35	litres.....	35.24
1 centimetre.....	=	.39	inch.....	.3937
1 cubic centimetre.....	=	.061	cubic inch.....	.0610
1 cubic foot.....	=	.028	cubic metre.....	.0283
1 cubic inch.....	=	16	cubic cent. †	16.39
1 cubic metre.....	=	35	cubic feet.....	35.31
1 cubit metre.....	=	1.3	cubic yards.....	1.308
1 cubic yard.....	=	.76	cubic metre.....	.7645
1 foot.....	=	30	centimetres.....	30.48
1 gallon.....	=	3.8	litres.....	3.785
1 grain.....	=	.065	gram.....	.0648
1 gram.....	=	15	grains.....	15.43
1 hectar.....	=	2.5	acres.....	2.471
1 inch.....	=	25	millimetres.....	25.40
1 kilo.....	=	2.2	pounds.....	2.205
1 kilometre.....	=	.62	mile.....	.6214
1 litre.....	=	.91	quart (dry).....	.9081
1 litre.....	=	1.1	quarts (liq'd).....	1.057
1 metre.....	=	3.3	feet.....	3.281
1 mile.....	=	1.6	kilometres.....	1.609
1 millimetre.....	=	.039	inch.....	.0394
1 ounce (av'd).....	=	28	grams.....	28.35
1 ounce (Troy).....	=	31	grams.....	31.10
1 peck.....	=	8.8	litres.....	8.809
1 pint.....	=	.47	litre.....	.4739
1 pound.....	=	.45	kilo.....	.4536
1 quart (dry).....	=	1.1	litres.....	1.101
1 quart (liquid).....	=	.95	litre.....	.9464
1 sq. centimetre.....	=	.15	sq. inch.....	.1550
1 sq. foot.....	=	.093	sq. metre.....	.0929
1 sq. inch.....	=	6.5	sq. centimetre's.....	6.452
1 sq. metre.....	=	1.2	sq. yards.....	1.196
1 sq. metre.....	=	11	sq. feet.....	10.76
1 sq. yard.....	=	.84	sq. metre.....	.8361
1 ton (2,000 lbs.).....	=	.91	metric ton.....	.9072
1 ton (2,240 lbs.).....	=	1	metric ton.....	1.017
1 ton (metric).....	=	1.1	ton (2,000 lbs).....	1.102
1 ton (metric).....	=	.98	ton (2,240 lbs).....	.9842
1 yard.....	=	.91	metre.....	.9144

* Contraction for kilogram. † Centimetres.

MET'RONOME, an instrument consisting of a weighted pendulum moving on a pivot and set in motion by clock-work; invented about 1814, for the purpose of determining, by its vibrations, the quickness or slowness with which musical compositions are to be executed



Metronome, showing extent of vibrations.

so as to mark the time exactly. There is a sliding weight attached to the pendulum rod, by the shifting of which up or down the vibrations may be made slower or quicker. A scale indicates the number of audible beats given per minute, and this must be made to agree with the number attached to the music by its composer.

METROSIDE'ROS, a genus of trees and shrubs, one species known as iron-wood, is a tree, a native of Java and

Amboyna. The trees of this genus have thick, opposite, entire leaves, and heads of showy red or white flowers.



Iron-wood.

METTERNICH (met'tér-nih), Clemens Lothar Wenzel, Prince von Metternich, Austrian statesman, born 1773, died 1859. He represented Austria as ambassador at various European courts between 1801 and 1809. In the latter year he became minister of foreign affairs. In this capacity he negotiated the marriage of the Archduchess Maria Louisa with Napoleon, and conducted her to Paris. In 1813, after the French reverses in Russia, Austria gave in her adhesion to the other allied powers, and declared war against France. From this period the policy, not only of Austria, but in a great measure that also of the leading continental powers, was shaped by Metternich. He was one of the plenipotentiaries who signed the Treaty of Paris, and he presided at the congress of Vienna (1814). The object of his policy was to arrest the progress of what were called revolutionary principles. With this view he formed the scheme known as the Holy Alliance. He continued in power till, by the revolution of 1848, he was driven from office, and had to flee to England, where he remained till 1851, when he returned and lived in retirement at Vienna.

METZ, a town and important fortress of Alsace-Lorraine, on the Moselle, which here divides into several arms, 79 miles northwest of Strasburg. Pop. 60,186.

MEURTHE-ET-MOSELLE (meurt-é mo-zel), a department of northeast France, formed in 1871 by uniting portions of the old departments of Meurthe and Moselle, in consequence of the cession by France to Prussia of a portion of her territory on the east under the treaty of Frankfurt (10th May, 1871); area, 2024 sq. miles. The capital is Nancy. Pop. 484,722.

MEUSE (meuz), a European river, which rises in France, in the south of the department Haute-Marne, and flows through France, Belgium, and Holland. Its length, including windings, is 580 miles. It is navigable for about 460 miles.

MEUSE, a northeast department of France; area, 2404 sq. miles. Bar-le-Duc is the capital. Pop. 283,480.

MEXICAN WAR, a war between the United States and Mexico in 1846-48, was the result of outrages upon American citizens, the recognition of the in-

dependence of Texas by the United States (1837), the annexation (1845) of Texas to the United States, in the face of bitter opposition on the part of Mexico, herself torn with revolution and contending factions, and finally of a dispute regarding the boundary of Texas, the United States claiming the Rio Grande as the boundary, while Mexico held that Texas did not extend farther south than the Nueces.

Gen. Zachary Taylor, with an army of 4000 men, arrived at the Rio Grande at a point opposite Matamoros, on March 28, 1846, where he erected Fort Brown. Gen. Ampudia, the Mexican commander at Matamoros, sent a note to Taylor, telling him to withdraw back to the Nueces under the alternative of war. Taylor refused, and in the meantime Gen. Arista superseded Ampudia, and sent part of his army across the river on April 24 to attack Taylor. Capt. Thornton, with a small party of American dragoons, sent up the river to watch the Mexican's movements, fell into an ambuscade on the 25th, a few were killed and the rest were captured. This was the formal beginning of the war. A messenger dispatched by Taylor soon reached Washington, and on May 11 President Polk sent a message to congress declaring that "Mexico has passed the boundary of the United States, has invaded our territory, and shed American blood upon American soil. War exists, and, notwithstanding all our efforts to avoid it, exists by the act of Mexico herself." Taylor, on May 8, with 3000 men, encountered Arista with 6000 at Palo Alta, defeating him, with a loss of forty-four Americans, and 600 Mexicans. On the 9th Taylor met the Mexicans at Resaca de la Palma, and won another victory, the American loss being 110 and the Mexican estimated at 1000. Taylor captured 100 prisoners, eight pieces of artillery and a large quantity of military stores. On the 18th Taylor crossed the Rio Grande and took possession of Matamoros, which had been evacuated by the retreating Mexicans.

Taylor, now promoted to be a major-general, remained at Matamoros, getting reinforcements, which were mostly volunteers, and in September, 1846, marched to Monterey. On the 19th the army encamped before the city, an attack was begun on the 20th, and after desperate fighting Ampudia surrendered the city on the 24th. An armistice of eight weeks, subject to revocation by either government at any time, was then agreed to, the Mexicans being allowed to take their army out of the city. As Taylor was making preparations to march against San Luis Potosi, orders came to him which stripped him of most of his best troops, which were sent to Gen. Scott, who was to invade Mexico from Vera Cruz. Taylor, encamped at Auga Neva, near Saltillo, learning that Santa Anna, who had been put in command of the Mexican army in the revolution which deposed President Paredes in the summer of 1846, and who became president in December of that year, was marching with 20,000 men to attack him, fell back a few miles to a

strong position at Buena Vista, with his force of 5,000, mostly volunteers, who had not participated in any of his battles. Here Taylor was assailed by Santa Anna on February 22, 1847, but after fierce fighting, Santa Anna retreated.

This was the end of the fighting under Taylor, and closed the campaign in the valley of the Rio Grande. Nevertheless, it gave Taylor the prestige which gained him the presidential nomination in the whig convention of 1848, and the election in that year.

Two months after Taylor's first battle on the Rio Grande, it was determined to prosecute the war on a larger scale, and General Winfield Scott, the commanding general of the American army, was sent to invade Mexico from a base at Vera Cruz. Vera Cruz was invested, and on the refusal of the Mexican general, Landero, in command of the city, to capitulate, Scott opened fire on March 22, and after a four days' terrific bombardment the city was surrendered with 5000 prisoners and 400 pieces of artillery.

On April 8, 1847, Scott began his memorable march to the City of Mexico. At a position of great natural strength in the mountain pass of Cerro Gordo, Scott, with 8500 men, encountered Santa Anna with 12,000 on April 17, stormed Santa Anna's position on the 18th, and captured 3000 prisoners, 4500 stand of arms and 43 cannon. Scott paroled his prisoners, captured Jalape without resistance on the 19th, occupied Perote, on the summit of the Cordilleras, on the 22d, and entered Puebla on May 15.

The arrival of Gen. Franklin Pierce with re-inforcements of about 2500 men in August set Scott's army again in motion. On the 6th of that month the march on the City of Mexico was resumed. On the 20th, Contreras and Cherubusco were captured after fierce fighting, 3000 prisoners being taken, including eight generals, two being ex-presidents, and thirty-seven pieces of artillery. An armistice was granted to Santa Anna on August 23, and Nicholas P. Trist, a special commissioner from Polk, opened negotiations with the Mexicans for peace. No agreement being reached and Santa Anna utilizing the cessation of operations by strengthening his fortifications, Scott resumed hostilities. On September 8 Molino del Rey was stormed by Worth, and on the 12th, after a two days' battle, Chapultepec, by Scott, was also carried by storm.

The Americans entered the City of Mexico on the 14th, the Mexican government having abandoned it on the previous day. There were some disturbances in the city on that day, and guerrilla fighting under Santa Anna's direction afterward, but the general result could not be changed. On February 2, 1848, at Guadalupe Hidalgo, a small town near the city of Mexico, a treaty of peace was signed by Trist, on the part of the United States, and three commissioners representing Mexico, whereby the southwest boundary of Texas was fixed at the Rio Grande, the line claimed by Texas and the United States, and New Mexico and California

were added to the United States, for which this country paid \$15,000,000 to Mexico, and assumed the payment of claims amounting to \$3,250,000 of American citizens against Mexico. The American flag was lowered in the city of Mexico on June 12, 1848, and the Mexican flag was run up. It was saluted by the American troops, who at once marched out of the city, and the evacuation of Mexico began. An addition of 545,783 square miles to the country's domain was made and the boundary of the United States was advanced to the Pacific.

MEXICO, or **MEJICO** (mā-hi-kō), a republic of North America, between the United States and Central America, and having on the east the Gulf of Mexico, on the west the Pacific Ocean; area estimated at 742,148 sq. miles. Nearly one-half of this territory lies within the torrid zone, but the peculiar geological structure of the republic, that of an elevated plateau rising into volcanic peaks, supported by the two branches of the Mexican Cordilleras, the northeast and northwest, causes the greatest diversity of climate. The largest river is the Rio Grande del Norte, forming part of the boundary with the United States. Mexico is a country of great natural resources. There is a vast variety of useful indigenous trees and plants, and many others have been introduced. The principal agricultural products are maize and other corn, sisal-hemp, tropical fruits, cotton, coffee, sugar, tobacco, indigo, vanilla, cochineal, etc. Large numbers of cattle are reared, especially in the north. The chief industries (besides agriculture and mining) are the manufacture of cottons and woolens, pottery, tobacco and cigars, leather, soap, sugar-refining, brewing, and distilling (principally from the agave or maguey), etc. Mexico is rich in minerals, especially gold and silver, which are far the most valuable of the exports.

The republic is divided into twenty-seven states; two territories; and what is called the Federal District, which comprises Mexico, the capital of the republic, and a small portion of adjoining territory. The population in 1908 was about 15,000,000. All religions are tolerated, but no religious body can own landed property. Primary education is compulsory, but the law is not strictly enforced. The schools are supported partly by the central and partly by the state government, and partly by charitable foundations supported by voluntary subscriptions. The present form of government is that of a federal republic, each member of which manages its own internal concerns. The supreme executive power is vested in a president, who has powers very similar to those of the president of the United States. There is an army numbering on the peace footing some 30,000 men. The chief money unit is the silver peso or dollar, nominal value 50c.

Prior to 1521 Mexico was inhabited by an Aztec race and ruled by native emperors. (See Aztecs.) This race had attained a remarkable degree of civilization, and interesting remains of their

architecture are existent in the *teocallis* or pyramids of Cholula, Pueblo, and Papantla. In 1521 Mexico fell into the hands of the Spaniards under Hernando Cortez. Cortez called it New Spain, and was created captain-general, but in 1535 was displaced by a viceroy. From that date till 1821 the country was one of the viceroyalties of Spanish America, and governed by a series of viceroys possessed of almost absolute-power. The spirit of discontent engendered by the selfishness of the Spanish rule manifested itself in open rebellion, when, in 1808 the deposition of King Ferdinand by Napoleon and the unsettled state of affairs in Spain afforded an opportunity. This rebellion, begun by a priest, Hidalgo, and continued with more or less vigor till 1821, secured in that year the independence of Mexico. After an unsuccessful attempt to secure a Bourbon prince for the throne, Iturbide, the chief of the insurgents, caused himself to be proclaimed emperor, May 18, 1822, under the title of Augustin I., but was forced to abdicate, March, 1823. A new form of government, on federal republican principles, was then established, the constitution being adopted and proclaimed in 1824. Since the acquisition of its independence Mexico has had a most unsettled history. The republican form of government has been interrupted by numerous dictatorships, and by the brief rule of the Austrian archduke Maximilian as emperor from 1864 till his execution in 1867; and till recently there has been almost incessant civil war. It has also been at war with Spain (1829), the United States (1847-48), the allied armies of Spain, France, and England (1861), and with France (1862).

MEXICO, capital of the republic of Mexico, is situated within the state of Mexico in the Federal district (461 sq. miles), about 7400 feet above the level of the sea, near several lakes. It is on the site of the ancient city of Tenochtitlan, which was destroyed on the capture of Mexico by the Spaniards in 1521. The principal public buildings are the cathedral, the palace of government, the college of mines, the mint, the town-house, the university, etc. Mexico enjoys a mild climate, and a pure and healthy atmosphere. Pop. estimated at 350,000.

MEXICO, one of the states of the Mexican republic; area, 7848 sq. miles. It lies in the south of Mexico, and forms an elevated region, one of the best cultivated and most thickly peopled part of the republic. Its capital is Toluca, but it embraces within its boundaries the city and Federal District of Mexico. Pop. 924,457.

MEXICO, Gulf of, a large bay or gulf of the Atlantic, oval in form, and nearly surrounded by a continuous coast line 3000 miles in length, of the United States and Mexico; estimated area, 800,000 sq. miles. It gives name to the Gulf Stream, which issues from it by the Strait of Florida.

MEYERBEER (mī'ēr-bār), Giacomo, musical composer, born in Berlin 1791, died at Paris 1864. His father was of Jewish descent. He gave early proof

of his devotion to music, and at nine was regarded as one of the best pianists in Berlin. He studied under Bernhard Anselm Weber at Berlin, and the Abbé Volger at Darmstadt, where he began his life-long friendship with Karl Maria von Weber. His first two operas, Jephtha's Daughter and Abimelek, the one produced at Munich and the other at Vienna, having failed, he went to Italy. There he rapidly composed a series of operas in the Italian style, which were generally well received: In 1826 he went to Paris. There he produced *Robert le Diable* (1831); *Les Huguenots* (Paris, 1836); *Le Prophète* (1849); and *L'Africaine* (1865). In these Parisian operas he ceases to be an imitator of the Italians, and it is upon them that his fame as a composer is founded. Besides his operas Meyerbeer wrote a great number of songs, an oratorio, cantatas, a *Te Deum*, etc.

MEZZOTINT, a particular manner of engraving on copper or steel in imitation of painting in Indian ink, the lights and gradations being scraped and burnished out of a prepared dark ground. The surface of the plate is first completely covered with minute incisions, so that it would give in this condition a uniform black impression. The design is then drawn on the face, and the dents are erased from the parts where the lights of the piece are to be, the parts which are to represent shades being left untouched or partially scraped according to the depth of tone.

MIAMA (mī-a'mī), a river of the United States, in Ohio, joining the Ohio below Cincinnati; length 150 miles.

MIASMA. See Malaria.

MICA, a mineral of a foliated structure, consisting of thin flexible laminae or scales, having a shining, pearly, and almost metallic luster. These are sometimes parallel, sometimes interwoven, sometimes wavy or undulated, sometimes representing filaments. The laminae of mica are easily separated, and are sometimes not more than the 300,000th part of an inch in thickness. The plates are sometimes as large as 36 inches diameter. They are employed in Russia for window panes, and in that state are called muscovy-glass. Mica enters into the composition of the crystalline rocks, as granite, gneiss, mica schists, chlorites, talcose rocks and occurs in trappean and volcanic products. It is found also in many sedimentary rocks, as shales and sandstones, giving them their laminated texture. In the latter case, it is derived from the disintegration of the crystalline rocks. It is essentially a silicate of alumina, with which are variously combined small proportions of the silicates of potash, soda, lithia, oxide of iron, oxide of manganese, etc., in accordance with which several species have been constituted, as common or potash mica, lithia mica, magnesia mica, pearl mica. Regarded as minerals, varieties of mica have received the names of biotite, lepidolite, muscovite, lepidomelane, steatite, etc.

MICACEOUS ROCKS, rocks of which mica is the chief ingredient, as mica slate and clay slate.

MICAH, the sixth of the minor prophets, a member of the tribe of Judah. He prophesied in the reigns of Jotham, Ahaz, and Hezekiah, and was a contemporary of Isaiah. His style is pure and correct, his images bold and vivid.

MICA SCHIST, **MICA SLATE**, a metamorphic rock, composed of mica and quartz; it is highly fissile and passes by insensible gradations into clay-slate.

MICHAEL, St. (Hebrew, "he who is equal to God"), in Jewish theosophy, the greatest of the angels (Daniel x. 13, 21; xii. 1), one of the seven archangels. In the New Testament he is spoken of as the guardian angel of the church (Jude, ver. 9; Rev. xii. 7). There is a festival of St. Michael and All Angels in the Western Church, held on 29th September. (See Michaelmas.)—The order of St. Michael and St. George is a British order of knighthood dating from 1818. It consists of Knights Grand Cross (G.C.M.G.), Knights Commanders (K.C.M.G.) and Companions (C.M.G.). The ribbon of the order is blue with a red stripe down the center. The badge is a white star of seven double rays, having in the center a representation of St. Michael overcoming Satan.

MICHAEL, St. or **SÃO MIGUEL**, the largest of the Azores, famous for the production of oranges and lemons, of which it exports 120,000 boxes annually. The population is about 115,000; capital, Ponta Delgado.

MICHAEL ANGELO. See Buonarroti.
MICHAELMAS, the feast of St. Michael the Archangel (see Michael, St.). It falls on the 29th of September, and is supposed to have been established toward the close of the 5th century.

MICHIGAN (mish'i-gan), one of the north-central United States; area, 58,915 sq. miles. It consists of two separate peninsulas—one projecting eastward between Lakes Superior, Huron, and Michigan, and bounded inland by Wisconsin; the other projecting northward between Lakes Michigan, Huron, St. Clair, and Erie, and bounded on the



Seal of Michigan.

south by Ohio and Indiana. It has upward of 1100 miles of lake-coast, with numerous bays and excellent harbors. The northwestern peninsula, occupying nearly a third of the whole surface, is comparatively elevated, and presents a succession of mountains and lakes, plains, rivers, and forests. The surface

of the other peninsula is gently undulating, and rises gradually from the lakes toward its center. It is mostly covered with fine forests of timber, interspersed with plains and prairies. Agriculture is the staple industry, the chief cereals being wheat and Indian corn. The remaining crops include barley, buckwheat, rye, hay, potatoes, tobacco, hops, etc. After agriculture, lumbering is perhaps the chief employment. The cultivation of fruit-trees is receiving increasing attention, and considerable quantities of apples and peaches are now exported. The mines in the northwestern peninsula produce hematite ore, from which is obtained great quantities of excellent iron; and here also are seated very rich copper mines. Salt of unsurpassed purity occurs in a basin extending over 8000 sq. miles. Manufacturing industries are varied and important. The important commerce of the state is greatly benefited by its large navigable waters and by its extensive system of railways, which measure some 7500 miles. The capital is Lansing, but the commercial metropolis and much the largest city is Detroit, Grand Rapids being next in size. In the primary schools education is free, but a fee may be required for advanced studies in higher schools. At the head of the educational institutions is the Michigan University, situated at Ann Arbor. Remains of ancient mines and mining implements have been found within the present limits of the state. The white discoverers and first settlers were French missionaries and fur traders, some of whom visited the site of Detroit as early as 1610. In 1641 French Jesuits found their way to the falls of the Saint Mary. The first actual settlement by Europeans within the limits of the state was the mission at Sault Sainte Marie, founded by Father Marquette and others in 1668. Three years later Michilimackinac (now Mackinac) was established. In 1679 and 1686 forts were built at the mouth of the Saint Joseph, and at the outlet of Lake Huron, and in 1701 Antoine de la Mothe-Cadillac founded Detroit. The territory, with other French possessions, fell into the hands of the English at the end of the French and Indian war. Detroit was occupied in 1763, but early in May of that year the Indians, loyal to the French, rose under Pontiac, massacred the garrison at Mackinac, and besieged Detroit for about five months. During the revolution Detroit was the starting point for many Indian expeditions which laid waste the American frontier. After 1784 the Indians of the northwest, deeming themselves unjustly treated by the Americans, waged a bloody warfare against the western settlements till they were brought to terms by General Wayne in 1795. By the treaty of peace concluded in that year, they ceded large tracts of land on the eastern shore of the southern peninsula of Michigan and in the north to the United States. On June 30, 1805, Michigan was set off as a separate territory, with substantially its present limits, and Gen. William Hull was appointed governor. During the war of 1812 the inhabitants

were harassed by the British and Indians; Mackinac was captured by the British; Detroit was surrendered by Governor Hull; and at Frenchtown, in 1813, a number of American prisoners of war were massacred by the Indians. In 1819 the territory was authorized to send a delegate to congress, and in 1823 the system of rule by a governor and three judges was replaced by that of a governor and a council of nine, selected from eighteen chosen by the people; in 1825 the council was increased to thirteen, and after 1827 the members were elected by popular vote. In 1835 a state constitution was adopted by a convention called for that purpose, but the admission of Michigan into the Union was delayed by a dispute with Ohio concerning a strip of land on the southern boundary. There was danger that the dispute would lead to bloodshed, but in 1836 congress agreed to admit Michigan upon condition that she should surrender her claim to the disputed territory and accept in lieu thereof a larger area in the Upper Peninsula. The first convention called to consider this proposal, January 26, 1836, rejected it, but it was accepted by a second in December, 1836, and on January 26, 1837, Michigan was admitted into the Union.

The opening of the Erie canal (1825) poured a vast stream of immigration into Michigan. The first bank was established at Detroit in 1818, and by 1837 there were fifteen such institutions. The state undertook the building of three railways across the Lower Peninsula, but after running greatly into debt was forced in 1846 to sell them. In 1847 the capital was removed from Detroit to Lansing. Legislation after the civil war was concerned largely with the taxation of corporations. In 1889 the Australian ballot was adopted. A factory inspection act was enacted in 1894, and a stringent anti-trust law in 1899. Michigan has consistently supported the republican party since its formation, except for three lapses—in 1882 and 1883, when the democrats and greenback party in fusion elected their candidate for governor, and in 1890, when the democrats alone carried the state. Pop. 2,875,000.

MICHIGAN, Lake, the second largest of the great lakes of North America. It is wholly within the United States, having the state of Michigan on the east and northwest, Wisconsin and Illinois on the west, and Indiana on the south. On the northeast it communicates with Lake Huron by the narrow strait of Mackinaw. It is 350 miles long, and on an average 60 miles broad; area, estimated at 26,000 sq. miles. The lake is 578 feet above sea-level; the greatest ascertained depth is about 1000 feet.

MICHIGAN CITY, a city in Laporte co., Ind., 56 miles east of Chicago, Ill.; on Lake Michigan, and on the Lake Erie and Western, the Chicago, Indianapolis and Louisville, and the Michigan Central railroads. It is the seat of the northern Indiana state prison, and has a United States life-saving station. There are good transportation facilities, to which are due the city's large commer-

cial interests, the trade being principally in lumber, salt, and iron ore. The manufactures of railroad cars, chairs, hosiery, and knit goods, lumber and products of lumber are important. Pop. 17,620.

MICHIGAN STATE AGRICULTURAL COLLEGE a coeducational state institution at Lansing, Mich., the oldest institution of its kind in the country. It was established in pursuance of a constitutional provision in 1855, and was opened in 1857. There are three courses, agricultural, mechanical, and women's or domestic science. Farmers' institutes are carried on annually in each county of the state.

MICHIGAN, University of, a coeducational state institution at Ann Arbor, Mich., chartered in 1837. The institution was opened in 1841, graduating its first class in 1845. It is intended primarily for the higher education of residents of the state, but receives students from all parts of the country on payment of a small tuition fee. The governing body is a board of regents, elected for terms of eight years. The university is organized in seven departments: literature, sciences, and the arts, engineering, medicine and surgery, law, pharmacy, the Homeopathic Medical College, and the College of Dental Surgery. Each department has its special faculty, with representation on the University Senate, which considers questions of common interest. The degrees conferred are bachelor and master of arts, science, and law; civil, mechanical, and electrical engineer; and doctor of philosophy, science, medicine, dental surgery, and dental science. The university was a pioneer in coeducation, women having first been admitted in 1870. They now constitute about one-fifth of the student body. Coeducation at the university has been uniformly successful. Entrance is based upon examination or upon certificates from accredited schools. The university has no dormitories and no commons. Recent extension of the elective system has resulted in a considerable loss in the choice of Latin, Greek, and mathematics, and a marked gain in the modern languages.

MICHOACAN', one of the states of Mexico, on the Pacific Coast; area, 25,689 sq. miles. It has rich mines of gold, silver, and other minerals. Capital Morelia. Pop. 930,033.

MICKIEWICZ (mits-kyā'vich), Adam, Polish poet; born 1798, died 1855. He wrote several epics, and is regarded as the chief national poet of his country.

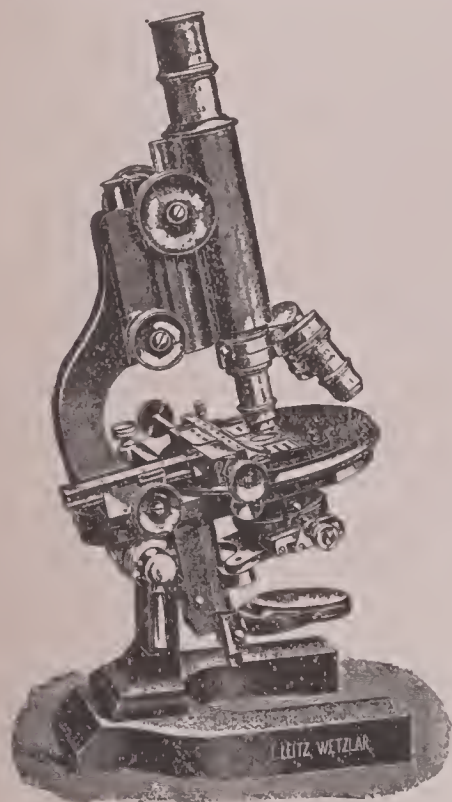
MICMACS, a tribe of North American Indians, mostly inhabiting New Brunswick and Nova Scotia, and numbering some 3600. Their language has been reduced to writing, and a dictionary of it has been compiled.

MICROMETER, an instrument used with a telescope or microscope, for measuring very small distances. Micrometers are variously constructed; but in perhaps the most common form (the filar micrometer) the principle of operation is that the instrument moves a fine thread or wire parallel to itself in the plane of the image of an object, formed in the focus of a telescope, the wire or thread being moved by means of

delicate screws with graduated heads, so that the distance traversed by the wire can be measured with the greatest precision. The micrometer is of the utmost value to the astronomer, and in trigonometrical surveys, and military and naval operations.

MICROPHONE, an instrument to make faint sounds more audible. The most sensitive conductor of sound is willow-charcoal, dipped when at white-heat into a bath of mercury. A piece of charcoal, thus prepared, placed vertically between two carbon-blocks which are connected with a telephone, is a common form of microphone, and magnifies sounds, otherwise inaudible, enormously.

MICROSCOPE, an optical instrument consisting of a lens or combination of lenses (in some cases mirrors also) which magnifies objects and thus renders visible minute objects that cannot be seen by the naked eye, or enlarges the apparent magnitude of small visible bodies, so as to enable us to examine their minute texture or structure. For a good microscope an achromatic combination of lenses to form an object-glass and a well-made eye-piece are necessary. The magnifying power of an instrument may be increased by (1) increasing the magnifying power of the object-glass; (2) increasing the



Compound microscope.

power of the eye-piece; (3) increasing the distance between the objective and the eye-piece. The simplest form of microscope is nothing more than a lens or sphere of any transparent substance, in the focus of which minute objects are placed. When a microscope consists of two or more lenses, one of which forms an enlarged image of objects, while the rest magnify that image, it is called a compound microscope. A binocular microscope is a microscope with two tubes starting from a point above the

object-glass, which is simple, and gradually diverging to fit the eyes of the observer. The rays of light arising from the object under observation are caused to diverge into the two tubes by a prism. A solar microscope has a reflector and a condenser connected with it, the former being employed to throw the sun's rays on the latter, by which it is condensed to illuminate the object placed in its focus. A lucernal microscope is the same in principle as the solar, except that a lamp is used, instead of the sun, to illuminate the object. When an oxyhydrogen lime-light is used it is called an oxyhydrogen microscope.

The magnifying power of a microscope varies inversely with the size of the objective, the smaller the objective the larger being the magnification. In looking into a compound microscope the observer sees only two dimensions—length and breadth. Magnification, therefore, is expressed in diameters, or areas. An object which is magnified 1,000 diameters is really magnified 1,000,000 times, that is, $1,000 \times 1,000$ times, 1,000 being the diameter of the magnification. The highest power lenses magnify 2,800 to 3,000 diameters. High powers lose in definition, so that often a lower power will show more detail than a higher.

MICROTASIMETER, an instrument for measuring extremely small variations, in the expansion or contraction caused by heat, moisture, etc. It has been used by astronomers to indicate the altered radiation of heat from the sun during an eclipse or when the atmosphere is filled with moisture.

MIDAS, in Greek mythology, king of Phrygia, whose request that whatsoever he touched should turn to gold was granted by the god Dionysus (Bacchus). In this way even his food became gold, and it was not until he had bathed in the Pactolus that the fatal gift was transferred to the river. Another legend is that, in a musical contest between Pan and Apollo, Midas, who was umpire, decided in favor of the former; whereupon the angry Apollo bestowed upon the presumptuous critic a pair of ass's ears.

MIDDLE AGES, a term applied loosely to that period in European history which lies between the ancient and modern civilizations. With some writers the period began when the western Roman Empire was overthrown by Odoacer in 476; with others when Charlemagne was crowned emperor of the West in 800; while yet others make it begin when the Frankish Empire ended in 843. The end of the period is variously conceived to have closed with the Reformation in Germany; with the discovery of America by Columbus; with the invention of printing; and with the end of the Thirty Years' war in the Peace of Westphalia (1648). The outstanding political events of Middle Ages include the rise of the German, French, and Italian nationalities; the rise of the Norman power, and the conquest of England by William of Normandy; the crusades; and the establishment of the Holy Roman (or German) Empire. The two most characteristic institutions which

grew up into widespread power during the Middle Ages were the feudal system (which see), the monastic institutions and the power of the papal hierarchy.

MIDDLESBROUGH, a river port and mun., parl., and county borough of England. Pop. 91,300.

MIDDLESEX, the metropolitan county of England, one of the smallest in the kingdom, but among the most important, from its containing the greater portion of the city of London; area, 181,317 acres. Pop. 3,585,139.

MIDDLETOWN, a city (settled in 1650, incorporated in 1784); formerly a port of entry, and one of the county-seats of Middlesex co., Conn.; on the Connecticut river opposite Portland, with which it is connected by an iron railway bridge, and on the N. Y., N. H., and Hart. railroad; 15 miles s. of Hartford, 24 miles n.e. of New Haven. Pop. 11,310.

MIDDLETOWN, a city in Orange co., N. Y., on the Wallkill river, and the Erie, the N. Y., Ont. and W., and the N. Y., Sus. and West. railways; 24 miles w.s.w. of Newburg, 66 miles n.n.w. of New York. It is in an agricultural and dairy region, is the seat of the New York Homœopathic Hospital for the insane. Pop. 17,315.

MIDDLETOWN, a city in Butler co., Ohio, on the Miami river, and the Cin., Ham. and Day., the Cleve., Cin., Chi. and St. L., the Cin. and Day., and the Middle. and Day. railways; 32 miles n. of Cincinnati. There are paper-mills, tobacco factories, paper-bag factories, foundry, planing-mill, and flour-mills. Pop. 11,140.

MIDGE, the ordinary name given to numerous minute species of flies, resembling the common gnat. The eggs are deposited in water, where they undergo metamorphosis.

MIDHAT PASHA, a Turkish statesman, born 1822, died 1884. He was educated in Constantinople; entered the Turkish civil service; attracted attention by his administrative capacity; became governor of Bulgaria in 1862, and was ultimately in 1876 created grand vizier. In this position he was supreme in the palace, and caused Abdul Aziz and Murad V. to be deposed. In the following year, however, he was himself banished; and in 1881, after a judicial investigation into the murder of Abdul Aziz, he was condemned and exiled to Arabia, where he died.

MIDIANITES, an Arabian tribe, represented in the Old Testament as the descendants of Midian, son of Abraham by Keturah (Gen. xxv.2), and described as engaged at an early period in commerce with Egypt. They dwelt in the land of Moab (Arabia Petraea), to the southeast of Canaan. One portion of them inhabited the country on the east of the Dead Sea.

MIDNAPUR, an administrative district of Bengal, with an area of 5082 sq. miles. Pop. 2,517,802.

MIDRASH, is the general name given among the Jews to the exposition of the hidden meaning of the Scriptures. It includes any and every ancient exposition on the law, psalms, and prophets.

MIDWIFERY, a branch of medicine or

surgery, also called obstetrics, being the art of aiding and facilitating childbirth, and of providing for the preservation of the health and life of the mother during and after her delivery.

MIGRATION OF ANIMALS, the phenomenon of certain animals moving, either periodically or at irregular times and seasons, from one locality or region to another, sometimes far distant. Migration has been observed in mammals, birds, fishes, and insects, but it probably occurs in other groups of the animal world, the observation of which is less easy than that of the higher forms. The buffaloes or bisons of North America used, it would seem, to migrate in herds from one place to another. Many fishes (for example salmon, lampreys, etc.) make periodical journeys from the sea toward fresh-water streams and rivers for the purpose of depositing their eggs. The migratory habits of locusts, and those of certain species of ants, etc., exemplify migration among insects; but among the birds we meet with the best-marked instances of migration. With sea-birds (for example, puffins), the day of arrival or that on which they appear in certain localities may be prognosticated with perfect safety; and similarly, the day of departure appears in some birds (for example, swifts), to be almost as accurately timed. Storks have been known to return regularly to their old nests, and the same has been observed of swallows. The mode in which birds migrate varies greatly even in the same species of bird. The swallows migrate in bodies comprising vast numbers, and so also do cranes, wild ducks, geese, and many other forms. The migratory flight is generally made against the wind; and certain species of birds, as quails for instance, appear to wait for favoring winds, and to delay their flight by resting on islands when the wind is unfavorable. Regarding the causes of migration, science cannot at present definitely pronounce. Probably a combination of causes, or different causes in different cases, as scarcity or plenty of food-supply, the powerful influences of temperature, and the influence of the breeding-season, may contribute to the migratory "instinct." It has been further suggested by Mr. A. R. Wallace, that this migratory habit or instinct has gradually been acquired since a time when the breeding and feeding grounds of the animals were coincident, these having been gradually separated by climatic and geological changes.

MIKADO (mi-kā'dō), the emperor of Japan, the spiritual as well as temporal head of the empire. See Japan.

MILAN, a city of Northern Italy, capital of the province of its own name. The city is entered by eleven gates, several of which are magnificent. The chief open space is the Piazza d'Armi (Place of Arms), part of which has been made into an amphitheater capable of containing 30,000 spectators. The castle, now a barrack, fronts the Piazza d'Armi on one side; at the opposite side is the Porta Sempione with the fine Arco Sempione or Arco della Pace, built of white marble. The Piazza del Duomo, in front of the cathedral, is the center of

the traffic of Milan. Among the public edifices the first place belongs to the Duomo or cathedral, a magnificent structure, inferior only in size to St. Peter's at Rome and the cathedral of Seville. It was begun in 1386, and was



Milan—The Cathedral, from the Corso Vittoria Emanuele.

only completed in 1805. There are many other fine edifices, among them being Palazzo di Brera or Delle Scienze Lettere ed Arte, containing the picture-gallery and the library of the academy (200,000 vols.); and the Ambrosian Library, the earliest, and still one of the most valuable public libraries in Europe. The chief theater is La Scala, accommodating 3600 spectators. The manufactures include silks, cottons, lace, carpets, hats, earthenware, jewelry, etc. Pop., including suburbs, 491,460.

MILDEW, a name given to various minute parasitic fungi producing a state of disease or decay in living and dead vegetable matter, and in some manufactured products of vegetable matter, such as cloth and paper. Numerous cultivated crops, fruit-trees, etc., suffer from mildew.

MILE, a measure of length or distance, and used as an itinerary measure in almost all countries of Europe. The English statute mile contains 8 furlongs, each 40 poles or perches, of $5\frac{1}{2}$ yards. The statute mile is therefore 1760 yards, or 5280 feet. It is also 80 surveying chains, of 22 yards each. The square mile is 6400 square chains, or 640 acres. The Roman mile was 1000 paces, each 5 feet; and a Roman foot being equal to 11.62 modern English inches, it follows that the ancient Roman mile was equal to 1614 English yards, or very nearly $\frac{1}{10}$ ths of an English statute mile. The ancient Scottish mile was 1984 yards = 1.127 English miles; the Irish mile, 2240 yards = 1.273 English miles; the German short mile is 3.897 English miles, the German long mile 5.753. The geographical or nautical mile is the sixtieth part of a degree of latitude, or 2028 yards nearly.

MILES, Nelson Appleton, American soldier, was born at Westminster, Mass.,

in 1839. He served in the battle of Fredericksburg, was wounded at Chancellorsville, and took part in the campaign before Richmond in 1864. In July, 1866, he was appointed colonel, fortieth infantry, regular army; and on March 2, 1867, he was brevetted brigadier and major-general, U. S. A., for bravery at Chancellorsville and Spottsylvania. During the succeeding year General Miles' chief service was against the Indians in the west. In 1886 he made a campaign against the Apaches and compelled their chiefs, Geronimo and Natchez, to surrender. In 1890 he became a major-general, and in 1895, he became the commanding general of the army. In 1897 he represented the United States army at Queen Victoria's jubilee. During the war of 1898 against Spain he directed in person the occupation of Porto Rico. He was raised to the rank of lieutenant-general in February, 1901, in pursuance of an act of congress of June 6, 1900. In 1902-03 he made a tour of inspection in the Philippine Islands.

MILESIANs, a name sometimes given to natives of Ireland, a portion of whose inhabitants, according to Irish tradition or legend, are descended from Milesius, a fabulous king of Spain, whose two sons conquered the island 1300 years before Christ, establishing a new nobility.

MILHAU (mē-yō). See Millau.

MILITARY LAW. See Martial Law.

MILITARY ORDERS. See Orders (Military).

MILITARY SCHOOLS, may be divided into two classes—regimental schools, which give training in the ordinary branches of education to soldiers and their children; and schools which are intended to prepare pupils for the duties of military service. The Royal Academy at Woolwich gives instruction in the special duties of the artillery and engineer branch of the service; the college at Sandhurst for infantry and cavalry; and the Greenwich Naval college for marine artillery. Schools for practical instruction to officers and men are also established: for gunnery, at Shoeburyness; for military engineering, at Chatham; for musketry, at Hythe; for army surgeons, at Netley; and there are also establishments for the education of officers of the regular army and of the auxiliary forces in the advanced branches of their profession in all the large garrison towns of the United Kingdom. Similar institutions exist in all European countries, in the United States (the Military Academy, West Point), and in Canada, where there is a military college at Kingston, and eight military schools in the different provinces.

MILITARY ACADEMY, United States, at West Point. Each senator, congressional district, and territory—also the District of Columbia, Porto Rico and Alaska—is entitled to have one cadet at the academy. There are also forty appointments at large, specially conferred by the president of the United States. The number of students is thus limited to 523.

Appointments are usually made one year in advance of date of admission, by the secretary of war, upon the nomina-

tion of the senator or representative. These nominations may either be made after competitive examination or given direct, at the option of the representative. The representative may nominate two legally qualified second candidates, to be designated alternates. The alternates will receive from the war department a letter of appointment, and will be examined with the regular appointee, and the best qualified will be admitted to the academy in the event of the failure of the principal to pass the prescribed preliminary examinations. Appointees to the Military Academy must be between seventeen and twenty-two years of age, free from any infirmity which may render them unfit for military service, and able to pass a careful examination in reading, writing, spelling, English grammar, English composition, English literature, arithmetic, algebra through quadratic equations, plane geometry, descriptive geography and the elements of physical geography, especially the geography of the United States, United States history, the outlines of general history, and the general principles of physiology and hygiene; or in lieu thereof to submit a certificate of graduation from a public high school or state normal school, or a certificate that the candidate is a regular student of an incorporated college or university.

The course of instruction, which is quite thorough, requires four years, and is largely mathematical and professional. The principal subjects taught are mathematics, English, French, drawing, drill regulations of all arms of the service, natural and experimental philosophy, chemistry, chemical physics, mineralogy, geology, electricity, history, international, constitutional, and military law, Spanish, civil and military engineering, art and science of war, and ordnance and gunnery. About one-fourth of those appointed usually fail to pass the preliminary examinations, and but little over one-half the remainder are finally graduated. The discipline is very strict—even more so than in the army—and the enforcement of penalties for offenses is inflexible rather than severe. Academic duties begin September 1 and continue until June 1. Examinations are held in each December and June, and cadets found proficient in studies and correct in conduct are given the particular standing in their class to which their merits entitle them, while those cadets deficient in either conduct or studies are discharged.

From about the middle of June to the end of August cadets live in camp, engaged only in military duties and receiving practical military instruction. Cadets are allowed but one leave of absence during the four years' course, and this is granted at the expiration of the first two years. The pay of a cadet is \$609.50 per year, and, with proper economy, is sufficient for his support. The number of students at the academy is usually about four hundred and seventy.

Upon graduating cadets are commissioned as second lieutenants in the United States army. The whole number of graduates from 1802 to 1906, inclu-

sive, has been 4,530. It is virtually absolutely necessary for a person seeking an appointment to apply to his senator or member of congress. The appointments by the president are usually restricted to sons of officers of the army and navy, who, by reason of their shifting residence, due to the necessities of the service, find it next to impossible to obtain an appointment otherwise.

MILITARY SERVICE INSTITUTION OF THE UNITED STATES, an organization of officers of the United States regular army and allied forces, associated for professional improvement, the interchange of views upon military matters, and such topics in general as may be calculated to promote the best interests of the army of the United States. The headquarters of the Institution are at Governor's Island, N. Y. The Journal of the Military Service Institution published its first number in January, 1880, and is devoted to regimental histories and the discussion of contemporary military questions, domestic and foreign.

MILITIA, the United States militia consists of every able-bodied male citizen of the respective states, territories, and the District of Columbia, and every able-bodied citizen of foreign birth, who has declared his intention to become a citizen, who is more than eighteen and less than forty-five years of age. It is divided into two classes—the organized militia, known as the National Guards of the state, territory, or District of Columbia, or by such other designation as may be given them by the laws of the respective states or territories, and the remainder known as the reserve militia. The organization, armament, and discipline are the same as those prescribed for the regular and volunteer armies of the United States. The president may call out, for a period not exceeding nine months, such numbers of the militia of the states, territories, or District of Columbia as he may deem necessary. During their period of service they become subject to the same rules and articles of war as the regular forces. Each state and territory and the Dis-

STATES AND TERRITORIES	Generals and General Staff Officers	Cavalry	Artillery	Infantry	Total Organized Militia	Number Available for Military Duty (Unorganized)
Alabama.....	9	67	136	2,084	2,296	72,000
Arizona.....	1	94	....	344	439	15,500
Arkansas.....	39	....	....	1,126	1,165	255,000
California.....	30	*237	292	2,750	3,353	232,500
Colorado.....	13	*261	59	741	1,074	70,000
Connecticut.....	14	97	252	2,449	2,812	109,500
Delaware.....	7	....	....	381	383	41,500
District of Columbia.....	14	†48	81	1,572	1,715	53,000
Florida.....	15	....	....	1,539	1,554	189,500
Georgia.....	21	401	257	2,233	2,912	306,000
Hawaii.....	5	46	....	469	510	8,250
Idaho.....	6	....	....	670	676	52,000
Illinois.....	40	*507	†181	5,052	5,780	757,500
Indiana.....	15	*†130	252	1,865	2,262	515,000
Iowa.....	17	*54	....	2,089	2,160	324,000
Kansas.....	12	....	60	1,099	1,171	112,000
Kentucky.....	7	49	157	1,012	1,223	255,000
Louisiana.....	9	*251	420	640	1,320	138,000
Maine.....	8	*†32	....	1,196	1,236	106,000
Maryland.....	13	56	....	2,053	2,122	200,000
Massachusetts.....	37	350	1,020	4,773	5,143	476,000
Michigan.....	17	....	....	2,973	2,390	290,000
Minnesota.....	10	....	215	1,667	1,692	216,000
Mississippi.....	19	....	....	1,186	1,205	269,000
Missouri.....	16	....	92	2,036	2,144	396,000
Montana.....	4	....	....	484	483	33,000
Nebraska.....	7	150	62	1,129	1,348	120,000
Nevada.....	7	....	....	129	136	7,400
New Hampshire.....	16	....	65	1,074	1,155	38,000
New Jersey.....	46	*771	129	4,944	4,290	420,000
New Mexico.....	3	69	....	338	410	39,100
New York.....	70	*550	1,796	11,860	14,276	1,000,000
North Carolina.....	47	....	60	1,495	1,602	282,000
North Dakota.....	7	....	....	612	619	60,000
Ohio.....	30	126	440	4,804	5,400	662,000
Oklahoma.....	7	*131	....	474	612	67,000
Oregon.....	10	61	70	872	1,013	79,500
Pennsylvania.....	52	*290	143	8,536	9,021	963,000
Rhode Island.....	20	150	96	652	916	68,000
South Carolina.....	18	....	....	2,236	2,254	100,000
South Dakota.....	3	....	....	769	772	60,000
Tennessee.....	7	....	42	1,797	1,846	170,000
Texas.....	44	*212	....	2,095	2,351	425,000
Utah.....	18	41	....	220	279	30,500
Vermont.....	4	....	97	597	694	47,000
Virginia.....	12	51	140	1,769	1,972	309,000
Washington.....	7	....	....	710	717	154,000
West Virginia.....	11	....	....	998	1,009	130,000
Wisconsin.....	9	65	70	2,480	2,624	355,000
Wyoming.....	7	53	....	230	290	12,000
Total.....	861	*4,780	6,684	95,253	107,578	11,086,750

* Includes Mounted Signal Corps. † Includes Ambulance Corps. ‡ Includes Engineer Corps. Alaska and Indian Territory have no militia, though provision is made for such if need arises. Guam and Samoa each has a small provisional force used more for police purposes than for military. The Philippines have a constabulary force which can be used either for police or war purposes, provided the latter is on the islands. So also Porto Rico has a provisional force of 700 foot and 100 mounted men, 100 non-commissioned officers, and 26 officers, the whole under command of a lieutenant-colonel of the United States Army. Numbers available in the Southern States include negroes capable of bearing arms.

trict of Columbia has an adjutant-general who is charged with the duties as prescribed by the state, and the rendering of regular reports to the secretary of war regarding the strength, condition, etc., of the organized militia of the state to which he belongs.

The table preceding is an abstract of the militia force of the United States, according to the records of the war department up to December 1, 1906.

MILK, the secretion peculiar to the females of the class mammalia, which is secreted in the mammary glands, and which is employed as the nutritive fluid of the young mammal after its birth. Examined by aid of the microscope, milk is seen to consist of a clear fluid, containing many globules, the average size of which is about $\frac{1}{1000}$ of an inch in diameter, and each appears to consist of oily matter invested by a thin layer of albumin. When churned, the globules in the milk are forced together en masse, and form butter. The cream of milk is formed by the globules rising to the top of the milk without coalescing; the "skim"-milk, or that left after the cream is formed, being of a pale bluish color, owing to its being deprived of its fatty or oily particles. In itself, milk exhibits the type of a perfect food. The casein of milk represents the albuminous or flesh constituents of food; the butter supplies the fatty or oleaginous parts; the water exists as such in milk, while it contains the saccharine constituents in the form of milk-sugar, and the inorganic parts in the form of phosphates of lime and alkaline chlorides, so necessary for the production of bone. The milk of every animal has certain peculiarities which distinguish it from all other milk, but the general properties are the same in all. In the making of butter, cream is allowed to stand for some time, during which an acid is generated. It is then put into a churn and agitated, when the butter gradually separates. The butter-milk, or that left after the separation of the butter by churning contains the casein, sugar, etc., of the milk; and the milk left after creaming also contains the greater part of the casein and milk sugar. Milk may be coagulated by various substances, but rennet prepared from the fourth stomach of the calf is generally used for domestic purposes. The result of coagulation is to separate the milk into a thin fluid, or whey, and a thick whitish deposit, the curd. (See Butter, Cheese.) Whey has a pleasant taste, and contains a large quantity of the milk-sugar, hence it is frequently used as drink, and from its nutritious quality it is administered to delicate people. It is also sometimes made to undergo fermentation, by which a very weak spirituous fluid is obtained. (See Koumiss.) Condensed milk (which see) is now largely used, and consists of ordinary milk which has undergone a process of evaporation and been mixed with sugar. Milk is very liable to be infected with the germs of disease, either from disease in the cow, contamination from unhealthy persons, or the use of infected water in cleaning vessels; and many epidemics of zymotic disease have been traced to impure milk.

MILK-FEVER, a febrile state sometimes induced in women when the milk begins to be secreted after parturition. It is accompanied with severe pains and throbbing in the head, flushing in the face, thirst, heat and dryness of the skin. The pulse is full, the tongue furred, bowels costive, urine scanty, and light and sound are painful. The treatment consists in cooling saline purgatives, good ventilation and moderate temperature in apartments, and encouraging the free flow of milk. Milk-fever attacks the lower animals, and in cows it is best prevented by unstimulating diet, and by milking the cow regularly ten days before calving.

MILK-SNAKE, a harmless snake of the United States.

MILKY-WAY. See Galaxy.

MILL, originally, a machine for grinding and reducing grain or other substance to fine particles; now applied also to machines for grinding or polishing by circular motion, and especially to complicated machinery for working up raw material and transforming it into a condition in which it is fit for immediate use or for employment in a further stage of manufacture. In the first sense of the word we have flour-mills and meal-mills, cider-mills, coffee-mills; in the second sense we speak of a lapidary's mill; and in the third sense we speak of cotton-mills, spinning-mills, weaving-mills, oil-mills, saw-mills, bark-mills, fulling-mills, etc. The word commonly includes the building for the special accommodation of the machinery, as well as the machinery itself. The oldest kind of flour or meal mill was the hand-mill or quern.

MILL, John Stuart, son of James Mill, was born in London 1806, died at Avignon 1873. At the age of fourteen he entered upon a course of political economy. His fifteenth year was spent in France; on his return he studied law for a time, and in 1823 he obtained a clerkship in the East India House, remaining in the company's employment till it was supplanted by the crown in 1858. In 1823 the Westminster Review was begun by the followers of Bentham, and young Mill was one of its earliest contributors, while from 1835 to 1840 he was its principal conductor. In his twenty-first year he edited Bentham's work *On Evidence*. In 1843 appeared the first of his two chief works, *A System of Logic, Ratiocinative and Inductive*, the second being *Principles of Political Economy*, 1848. To these he afterward added his work *On Liberty*, 1859; *Thoughts on Parliamentary Reform*, 1861; *Utilitarianism*, 1862; the Examination of Sir William Hamilton's Philosophy, and a Study of Auguste Comte and Positivism, 1865. His Autobiography was published in 1873, and the three essays, *Nature*, *The Utility of Religion*, and *Theism*, in 1874. Mill's works on logic and political economy are standard text-books. In the former he placed the system of inductive logic on a firm basis. See *Logic*.

MILLAIS (mil'ās), Sir John Everett, Bart., R. A., born at Southampton 1829. In his earlier days he was a leader of the Pre-Raphaelite School, but on attaining maturity in art he abandoned the

peculiarities for which that school is noted. As the result of this new departure Millais painted such pictures as *Ferdinand Lured by Ariel*, *Mariana in the Moated Grange*, *The Huguenot Lovers*, *The Black Brunswicker* and



Sir John E. Millais, R. A.

Ophelia, while its influence was also apparent in his landscapes of *Chill October*, *The Fringe of the Moor*, etc. In portraiture he holds the foremost rank and has painted a number of the most distinguished men of the day. He was made a baronet in 1885, and he was also a member of the Legion of Honor. Many of his works are well known by engravings. He died in 1896.

MILLENNIUM, an aggregate of a thousand years; a word used to denote the thousand years mentioned in Rev. xx. 1-5, during which period Satan will be bound and restrained from seducing men to sin, and during which, millenarians believe, Christ will reign on earth with his saints. The near approach of the millennium has been often foretold.

MILLEPEDE, a name common to animals resembling centipedes from the number of their feet. The most common is about $1\frac{1}{4}$ inch long. The young when hatched have only three pairs of legs, the remainder being gradually acquired till the number is complete, which is usually about 120 pairs.

MILLER, Hugh, geologist, was born at Cromarty in 1802. In 1840 he went to Edinburgh as editor of the *Witness* newspaper, after 1843 the chief organ of the Free Church. In this paper he printed the work subsequently published under the title of *The Old Red Sandstone*, which attracted the immediate attention of the scientific world and established his reputation as a geologist. This was followed by *First Impressions of England and its People*; *Footsteps of the Creator*; *My Schools and Schoolmasters*, a charming account of his earlier life; and *The Testimony of the Rocks*, in which he tried to reconcile the Mosaic account of creation with the teachings of geology. Having just finished this latter work, his brain collapsed from over-pressure, and he died by a pistol-shot from his own hand at Portobello in 1856. His *Schools and Schoolmasters* was supplanted by the *Life and Letters*, published in 1871.

MILLER, Joaquin, the pen-name of Cincinnati Heine Miller, born 1841 in Indiana; spent some time in the California mining districts; lived with the Modoc Indians for five years; edited a

newspaper called the democratic Register; studied law and was called to the bar in Oregon, and became district judge in Canyon City, subsequently settled in California. He has written Pacific Poems, Songs of the Sierras, Songs of the Sun Lands, Songs of the Desert, Songs of the Mexican Seas, besides novels and dramas.

MILLER, Joseph, better known as Joe Miller, was born in 1684, it is supposed in London, and was a favorite low comedian. He died in 1738. The jests which have immortalized his name were collected in 1738, by John Mottley, author of the life of Peter the Great, and other works.

MILLER, William, the founder of an American religious sect holding peculiar millennial views, was born at Pittsfield, Massachusetts, in 1781, and died in 1849. About 1843 the second coming of Christ was expected by as many as 50,000 believers in the doctrines of Miller; and, although the disappointment of their hopes somewhat diminished their numbers, many continued their adherence to his tenets regarding the nature of the millennium.

MILLET, a common name for various species of cereals yielding abundance of small seeds, cultivated in the East Indies, China, Arabia, Syria, Egypt, etc., where it is used as human food. The leaves and panicles are given both green and dried as fodder to cattle. German millet is cultivated on account of its seeds, which are used as food for cage-birds. Italian millet is a closely allied species.

MILLET (mi-lā), Jean François, French artist, born at Gruchy, near Cherbourg, in 1814, died in 1875. He worked with his peasant father in the fields; studied drawing at the academy of Cherbourg; from thence passed with an allowance from this town to the atelier of Delaroche in Paris, and exhibited at the Salon in 1840. As a student and until the death of his first wife in 1844 he was frequently in the greatest poverty, and his life subsequently was by no means free from difficulty. In 1849 he left Paris and settled among the peasants of Barbizon, on the edge of Fontainebleau Forest, and devoted himself to transferring their simple everyday life to his canvases, which he did with great truth of sentiment and subdued poetic charm. Of his paintings may be mentioned *The Sheep-shearers*, *The Gleaners*, *The Sower*, *The Shepherdess with her Flock*, and *The Angelus*. The last was sold by auction in Paris in 1889 for about \$115,000. His works are at present very highly esteemed.

MILLIGRAMME, a French weight, the thousandth part of a gramme, or .0154 of a grain.

MILLIMETRE, a French lineal measure containing the thousandth part of a meter; equal to .03937 of an inch.

MILMAN, Henry Hart, D.D., born in London 1791, died 1868. His principal works are: *Samor*, a legendary poem; *The Fall of Jerusalem*; *The Martyr of Antioch*; *History of the Jews*; *History of Christianity to the Abolition of Paganism*; *History of Latin Christianity*.

MILTIADES (dēz), an Athenian general of the 5th century B.C. When Greece

was invaded by the Persians he was elected one of the ten generals, and drew up the army on the field of Marathon, where, B.C. 490, he gained a memorable victory. Next year he persuaded the Greeks to intrust him with a fleet of seventy vessels, in order to follow up his success. With this, to gratify a private revenge, he attacked the island of Paros, but was repulsed, and dangerously wounded. On his return to Athens he was impeached, and condemned to pay a fine of fifty talents. Being unable to pay, he was thrown into prison, where he soon after died of his wound.

MILTON, John, English poet, was born in London, Eng., Dec. 9, 1608; died there, Nov. 8, 1674. At the age of seventeen he entered Christ's College, Cambridge, where he resided for seven years. It had been intended by his parents that he should enter the church, but their puritanical beliefs and his own scruples regarding the oaths decided otherwise. In 1637, on the death of his mother, he made a continental journey,



Milton.

in which he visited Paris, where he was introduced to Grotius, Florence, where he met Galileo, Rome and Naples. After remaining abroad for fifteen months he returned to England. The home at Horton having been broken up, Milton settled in the metropolis. While settled here his *Paradise Lost* was partially sketched out. In the summer of 1643 Milton married Mary Powell, the daughter of a royalist family. Divided from her kinsfolk by politics, he was also dissimilar to his wife in age—she being little more than seventeen, while he was thirty-five. Moreover, she found his habits austere and his house dull, with the result that she returned to her father about a month after marriage. In the end, however, his wife returned in 1645, bore him three daughters, and continued to live with him until her death in 1653. When in 1649 Charles I. was executed and a republic established, Milton avowed his adherence to it in his pamphlet *Tenure of Kings and Magistrates*, and was appointed foreign (Latin) secretary to the commonwealth. In his literary task his eyesight suffered so much that in 1652 he became totally blind. In 1663 he began the writing of *Paradise Lost*. This was published in 1667, the publisher agreeing to pay the author \$25 down and a further \$25 after the sale of each edition of 1300 copies. In two

years a second edition, now arranged into twelve books, was printed, and Milton's position as the greatest poet of his time was established. In 1670 there appeared his *History of Britain to the Norman Conquest*, and in the following year the continued vigor of his poetic faculty was shown in *Paradise Regained* and *Samson Agonistes*. In 1674, the last year of his life, he printed his *Epistola Familiares* and *Prolusiones Oratoriae*. His death took place at his house in Bunhill, and he was buried in the church of St. Giles, Cripplegate.

MILLVILLE, a city in Cumberland co., N. J., on the Maurice river, here navigable, and the W. Jersey railroad; 40 miles s. of Philadelphia. Pop. 11,790.

MILWAU'KEE, chief city and port of Wisconsin, United States, on the west shore of Lake Michigan, which here receives the united rivers Milwaukee and Menomonee. It has an elevation of from 600 to 700 feet above sea level, rising from 80 to 125 feet above Lake Michigan, and reaching its greatest height in Kilbourn Park, which affords a fine view. The business quarter is near the Milwaukee river, while the largest and most beautiful residence sections lies to the west and east, and are characterized by handsomely shaded avenues and detached houses. The accessibility of popular health and pleasure resorts and the beauty of its suburbs, add to the attractions of Milwaukee. Among these suburbs is the city of Wauwatosa—the seat of the state fair grounds and of a group of county institutions: almshouse, hospital, hospital for the insane, chronic insane asylum, and a children's home. The rivers are spanned by a number of bridges, and there are three viaducts, one of which, over the Menominee Valley is nearly a mile long.

Among the most prominent buildings are the city hall, the county court-house, the United States government building, and the public library and museum. The library has 120,000 volumes and maintains a number of branches in various parts of the city. The Layton Art Gallery is located in a fine building and possesses a valuable collection. The chamber of commerce, athenæum, light-house, squadron armory, and the Germania, Pabst, and Mitchell buildings also are noteworthy structures. A mile west of the city limits is a National Soldier's Home, accommodating 2400 inmates and surrounded by 400 acres of well-kept grounds.

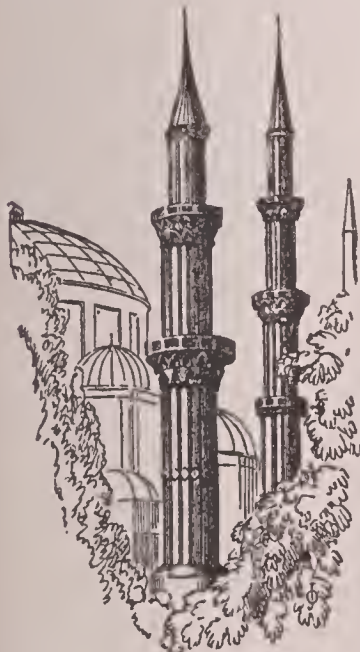
The Johnston emergency hospital, the Milwaukee general hospital, the United States marine hospital, and the state industrial home for girls are among a large number of charitable institutions of various kinds. Owing to the large population of German birth and descent, Turner and musical societies play an unusually important part in the club and society life of the city. Milwaukee is the seat of a Roman Catholic archbishop and of a Protestant Episcopal bishop.

The main element in the prosperity of Milwaukee is its vast trade in grain, and extensive industrial establishments connected with iron, flour, leather, lager-beer, agricultural implements, etc.

It has rapidly advanced from a population in 1840 of 1700 to one of 400,000.

MIMICRY, the name given to that condition or phenomenon which consists in certain plants and animals exhibiting a wonderful resemblance to certain other plants or animals, or to the natural objects in the midst of which they live. This peculiar characteristic is generally the chief means of protection the animal has against its enemies. It is well seen in the leaf-insects and in the "walking-stick" insects. Certain tropical butterflies reproduce the appearance of leaves so closely that even the parasitic fungi which grow upon the leaves are imitated. So also a South American moth has a most accurate resemblance to a humming bird; while the cacti of America and the euphorbias of Africa might easily be mistaken for each other, though widely different in structural characters. The theoretical explanation of this mimetic quality is attributed by recent biologists to purposes of self preservation. Thus, the form or color which enables an animal to seize its prey easily and to protect its own life by deceptive resemblance to other objects, is conceived to be that form and color which is most likely to survive. The term is used in a merely metaphorical sense, and implies no act of volition on the part of the animal or plant.

MIN'ARET, a slender lofty turret rising by different stages or stories, surrounded by one or more projecting balconies, commonly attached to mosques in Mohammedan countries, and frequently of very elegant design.



Minarets—Mosque of St. Sophia, Constantinople.

Minarets are used by the priests for summoning from the balconies the people to prayers at stated times of the day; so that they answer the purpose of belfries in Christian churches.

MINAS GERAES (mē'nás je-rä'es), the most populous of the Brazilian states, bounded by Bahia, Espirito Santo, Rio de Janeiro, Sao Paulo, and Goyaz; area 246,700 sq. miles. The capital is Bello Horizonte. Pop. 3,018,807.

MIND, a term that admits of no exhaustive scientific definition, but may be said to indicate, generally, the power possessed by each of us in virtue of which we know, think, feel, and will. Limited to the individual, and verifiable only through individual experience, its phenomena have long been held to represent the immaterial as distinguished from the material world, mind and matter forming thus a direct antithesis. Yet we have no experience of mind as apart from matter, and many, instead of regarding mind as a separate entity, hold it rather to be akin to some function of the nervous system. The mental powers or functions are generally classed as three—intellect or understanding, emotion or feeling, and volition or will. Sometimes the term mind is specially given to the first (the intellect), which itself possesses several powers or capacities, such as perception, memory, reasoning, imagination. It is by the intellect that we acquire knowledge, investigate phenomena, and combine means to ends, etc.; but the ultimate analysis of our mental powers gives different results with different investigators, the classification of the faculties of the mind being thus very various. The science that has specially to do with the investigation of mental phenomena is generally known as psychology. See also Emotion, Imagination, Will, etc.

MINDANA'O, one of the Philippine Islands, next to Luzon in point of size, about 300 miles long and 105 broad; area, 34,250 sq. miles. All the country, except upon the sea-coast, is mountainous, the volcano of Apo being 8819 feet high. The chief rivers are the Mindanao and the Batuan, and there are several lakes. Some coffee, cocoa, and cotton are exported. The chief town is Zamboanga or Samboangan, a port and naval station at its western extremity. The total population, according to a recent American estimate, is about 300,000. Mindanao was ceded by Spain to the United States in 1898.

MINDO'RO, one of the larger of the Philippine Islands, situated south of Luzon, from which it is separated by the Strait of Manila; about 110 miles long by about 53 broad. It is evidently volcanic, the climate is hot, and the rain almost incessant. Rice, cacao, and wild cinnamon are among the products. Pop. 61,900.

MINE, in military language a subterranean passage dug under the wall or rampart of a fortification, or under any building or other object, for the purpose of blowing it up by gunpowder or other explosive. What are called submarine mines are now used in the defense of places liable to attack from a naval force. Such a mine consists of a charge of some powerful explosive inclosed in a suitable case, which is anchored at the bottom of the water, or at a suitable depth, and may be exploded at will by means of electricity so as to blow up a hostile vessel, or the mere contact of a vessel may cause it to explode.

In ordinary language a mine is a pit or deep excavation in the earth, from which coal, metallic ores, and other mineral substances are taken. The pits

from which stones only are taken are called quarries. See Mining and Mine Inspection.

MINE WORKERS OF AMERICA, The United, American labor union, the largest in the country organized January 25, 1890, the object of which is to unite mine employees that produce or handle coal or coke in or around the mines and ameliorate their condition by means of conciliation, arbitration or strikes. The national executive committee consists of the president, vice-president, secretary, treasurer, and one delegate from each of the 25 districts. In the bituminous districts of Illinois, Indiana, Ohio, and Pennsylvania strikes have been practically eliminated by the annual joint conference, or collective bargaining, between the miners and operatives, in which a scale of prices for the following year is adopted and the settlement of further differences provided for by local boards of arbitration. Mr. John Mitchell was elected president in 1898 and has held that position constantly since that time.

MINERAL'OGY, the science which treats of the properties of mineral substances, and teaches us to characterize, distinguish, and classify them according to their properties. It comprehends the study or science of all inorganic substances in the earth or on its surface. As distinguished from geology, mineralogy deals with the various mineral bodies as separate constituents of the earth's crust, and examines their properties as such, while geology treats them in the aggregate, as building up the crust of the earth, and as forming masses and presenting phenomena that have a history to be investigated. Minerals may be described and classified either in accordance with their chemical composition, their crystallographic forms, or their physical properties of hardness, fracture, luster, etc., or a combination of all, and thus various systems of classification have been adopted. Most minerals crystallize in definite forms, and this form is one of the chief characteristics of many mineral species. There are not a few, however, which are not distinctly crystalline, but are earthy or occur in masses; the latter exhibiting important varieties of structure, as laminated, fibrous, granular reniform, botryoidal, etc. Other distinctive characteristics are color, which, however, varies even in the same mineral; luster, the character of the light reflected from the surface, and described as adamantine, vitreous, nacreous, greasy, silky, etc.; fracture, or the character of the freshly-broken surface; streak, or the appearance and color of a furrow made in the mineral by a hard-tempered knife or file; and hardness, which is now determined by what is called Mohs's scale. In this scale certain minerals are represented by numbers from 1 to 10, viz. (1) talc, common laminated light-green variety; (2) gypsum, a crystallized variety; (2.5) mica; (3) calcite, transparent variety; (4) fluorspar, crystalline variety; (5) apatite, transparent variety; (5.5) scapolite, crystalline variety; (6) potash, felspar, white cleavable variety; (7) quartz, transparent; (8) topaz, transparent; (9)

corundum; (10) diamond. To determine the hardness of a mineral, it is ascertained by experiment which of these it will scratch and which will scratch it; thus if a mineral will scratch flint but not apatite, while the latter will scratch it, its hardness is between 4 and 5. Diaphaneity, refraction, polarization, electric properties, etc., are all distinguishing marks. In the classification of minerals, their chemical composition, though not to be regarded by itself, is of much importance. Among famous names in connection with mineralogy may be noted those of Werner, Haüy, Mohs, Dana, etc.

MINERAL WATERS is the term commonly applied to the spring-waters that contain an unusual quantity of such substances as sodium, magnesia, iron, carbonic acid, and sulphur; but it cannot be used in any absolute fashion. The most popular European springs are those of Aix-la-Chapelle, Wiesbaden, Baden-Baden, Carlsbad, Ahrweiler (Apollinaris), Friedrichshall, Buda-Pesth (Hunyadi-Janos), Vichy, and Bath. The most popular springs in the United States are Congress, and Excelsior, at Saratoga, N. Y.; Warm Sulphur Springs, Virginia; Hot Springs, Arkansas; Red Sulphur Spring, Sharon, N. Y.; Las Vegas Hot Springs, N. Mex.; Bethesda Spring, Waukesha, Wis. The waters are usually drunk at an early hour before breakfast, and the curative effects are greatly aided by early rising, moderate exercise, mental relaxation, and complete freedom from all kinds of excess. It has not been found practical or useful to classify mineral waters under their chemical elements, but the attempt has been made, as where the springs are described as—salt, earthy, sulphur, iron, alkaline, and alkaline-saline. Besides the substances which these terms indicate, the waters are frequently impregnated with carbonic acid gas, which is found to aid digestion while giving a pleasant stimulus to the general system.

MINERAL WOOL, a substance which is produced from the vitreous liquid slag of a blast-furnace drawn out into fine fibres under pressure of steam. The slag, when in a molten condition, is driven by the steam from the furnace through a crescent-shaped aperture, and suddenly cools into long fibrous filaments. The thin, glassy, thread-like substance thus produced is useful as a non-conductor of heat, and it has, therefore, been largely employed as a covering for boilers and steam-pipes, to prevent the freezing of water in pipes, etc.

MINERVA, a daughter of Jupiter, and one of the great divinities of the ancient Romans. She was looked upon as the patroness of all arts and trades, and her annual festival, called Quinquatrus, lasted from the 19th to the 23d of March inclusive. This goddess was believed to protect warriors in battle, and to her was ascribed the invention of numbers, and of musical instruments, especially wind-instruments. At Rome a temple was built for Minerva by Tarquin on the capitol, where she was worshipped along with Jupiter and Juno; and there was also a temple on the Aventine dedicated to herself alone. This deity is supposed

to be of Etruscan origin, and her character has much in common with the Greek goddess Athena.

MINHO (min'yō), more fully Entre Douro e Minho, a province of Portugal, Pop. 1,014,768.

MINIATURE, a small painting, especially a portrait, executed with delicate care, chiefly upon ivory, also upon vellum, paper, etc. The term is from the Italian *miniatura*, originally applied to a small painting, such as those formerly used to adorn manuscripts, from the common use of minium or vermillion in the ornamentation of the illuminated manuscripts in the middle ages. The art of miniature painting was carried to its highest perfection, chiefly in France, during the 18th century.

MINING is the term applied to the underground engineering process by which minerals are excavated and brought to the earth's surface. That this process in a rude form was known to the ancients is shown by references in the book of Job, the records of the Phoenicians and Egyptians, and the signs of supposed Roman excavations found in

the lode, and if the lode is going down on a slope, the galleries in such case are not vertical above one another. These galleries are connected by vertical passages or "winzes;" and in this way they are ventilated, and the material to be excavated is divided into rectangular blocks. The metal ore after being excavated is broken up by the miner, put into a barrow, wheeled to one of the main galleries, thence transported in cars drawn on rails by men, mules, or engines, to the main shaft. There it is hoisted to the surface in an iron "kibble" or a wooden "skip" which travels up and down in guides fixed to the side of the shaft. Access to many metalliferous mines is still obtained by means of ladders fixed almost vertically in the sides of the shaft. This toilsome method is averted in some mines by what is called a "man-engine," which consists of two rods with platforms attached which move up and down reciprocally the distance between two platforms, the miner ascending or descending from the platform of one rod to that of another alternately. Besides the shafts there is



Section of part of copper mine.
The parts lightly shaded indicate where the mineral has been removed.

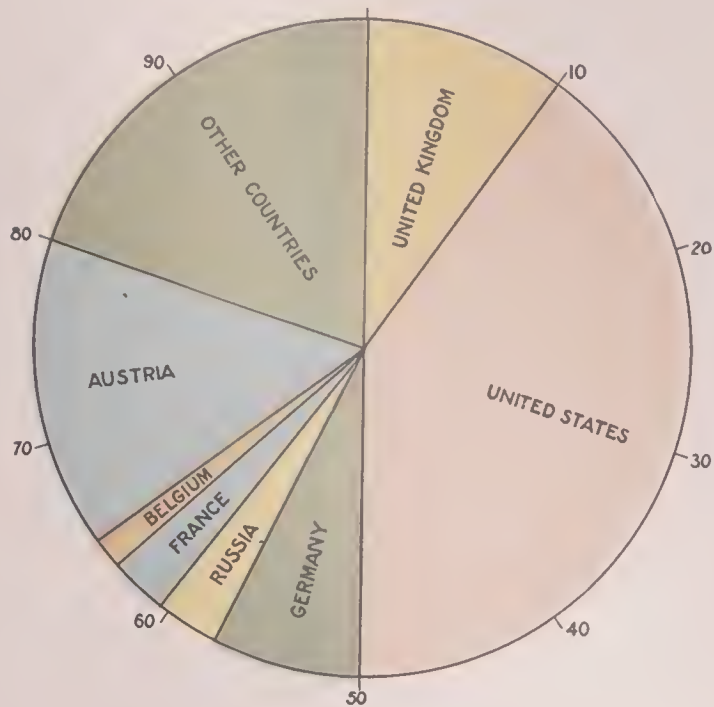
Britain. The development of mining has been greatly advanced by the introduction of gunpowder for blasting purposes; by the use of steam-engines for pumping water from the mine and bringing material to the surface; and by the aid of improved ventilation, which now enables mines to be carried to deeper levels.

Metalliferous mining has to deal with a mineral which is found in lodes or veins irregularly imbedded in rock-fissures, the trend of which is uncertain and the thickness variable. In preparing to excavate this irregularly distributed mineral two shafts are sunk in the vicinity of the lodes, one of which is used for pumping and ventilating the mine, the other for drawing the material to the surface. From these two shafts horizontal galleries are driven at distances of 10 or more fathoms apart, an additional gallery being driven at intervals of 10 or 15 fathoms as the mine is increased in depth. The galleries are driven as far as possible on the course of

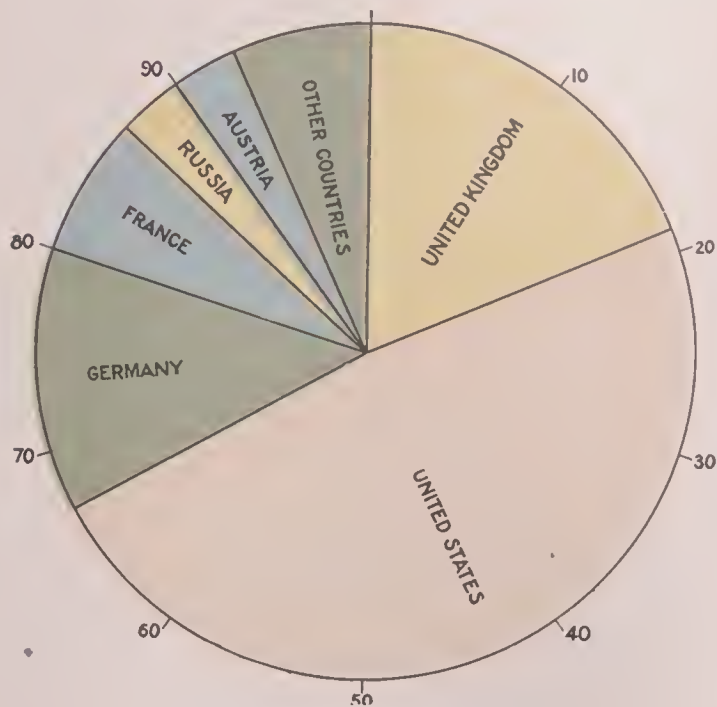
usually an entrance to the mine called an "adit" or "day-level" which is driven straight into the mine from the nearest convenient depression or valley and is mainly used for purposes of drainage. Adits are sometimes of great length.

Coal-mining has to deal with a mineral which is deposited in seams or beds, sometimes nearly horizontal, at other times nearly vertical. These seams are interstratified with layers of sandstone, shale, clay, etc., and when the beds are tilted the coal has been frequently found outcropping at the surface. In the chief coal-fields of the United Kingdom this outcrop coal has been exhausted, and it is now found necessary to approach the coal-seams by means of shafts, of a rectangular or circular shape, sunk into the earth. The rectangular shape, commonly 18 feet by 6 feet, is that which is used most frequently in Scotland, while the circular shaft obtains in the large mines of Northumberland and Durham. Before sinking the shaft it is expedient

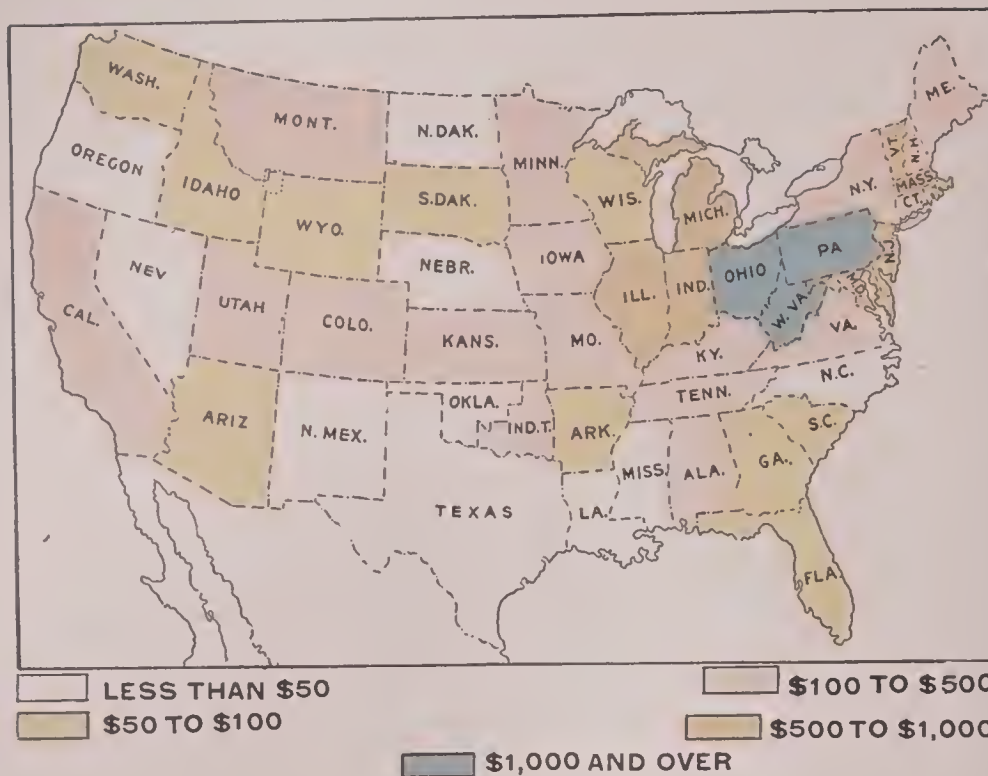
WEIGHT OF MINERAL RAISED YEARLY



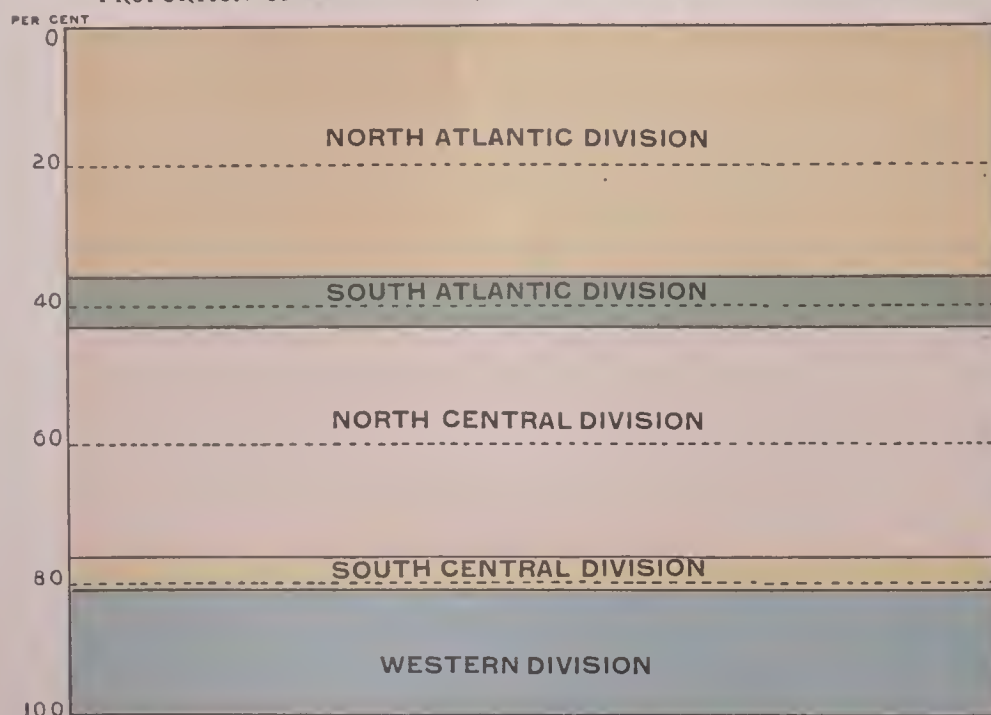
VALUE OF MINERAL PRODUCT YEARLY



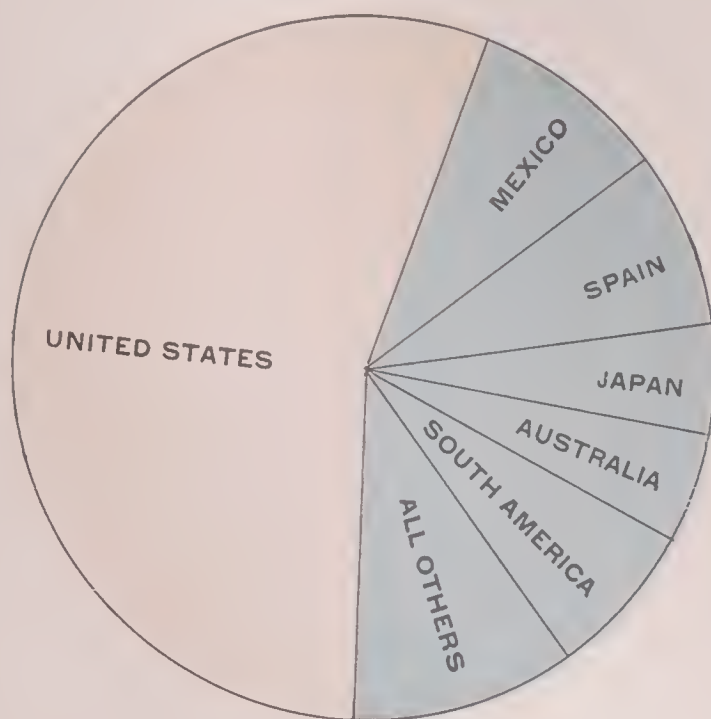
VALUE PER SQUARE MILE OF MINERALS PRODUCED BY STATES AND TERRITORIES



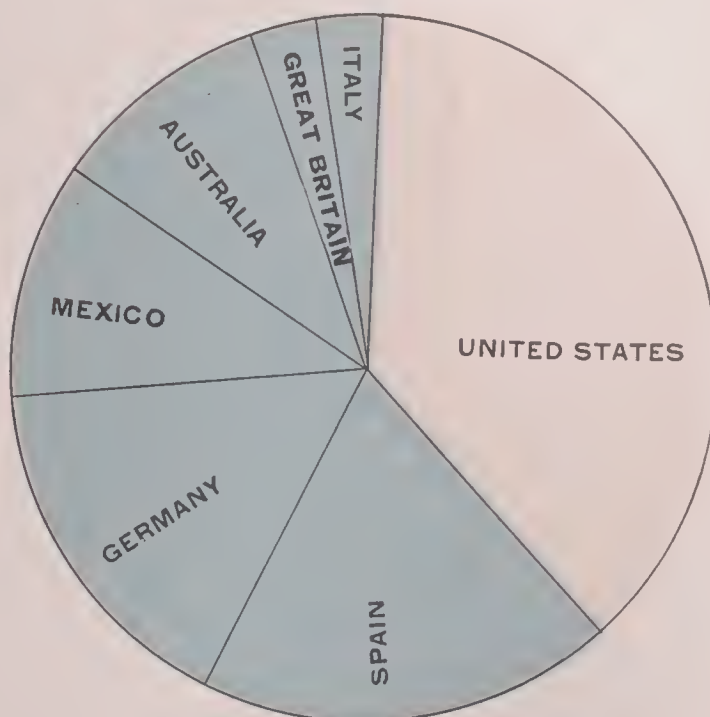
PROPORTION OF MINERALS PRODUCED BY GEOGRAPHIC DIVISIONS



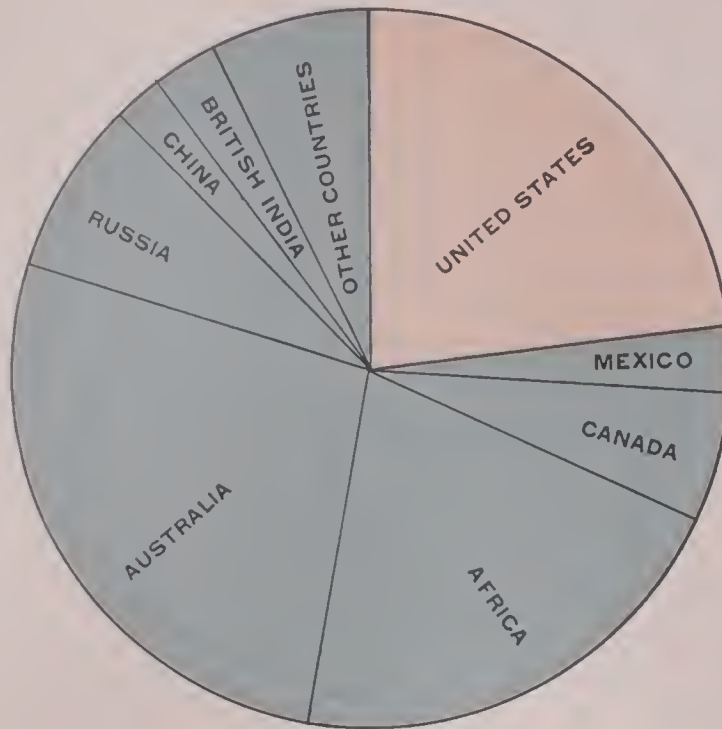
WORLD'S PRODUCTION OF COPPER



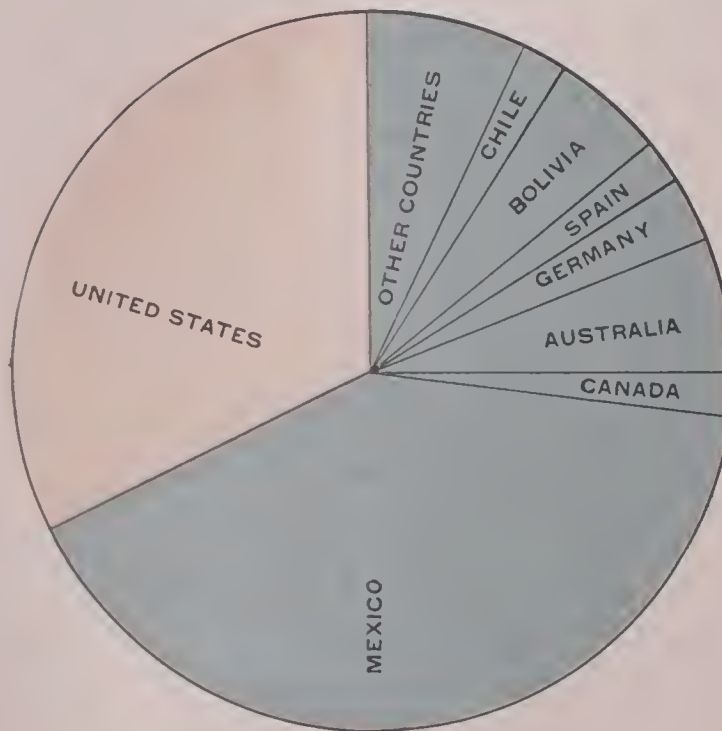
WORLD'S PRODUCTION OF LEAD



WORLD'S PRODUCTION OF GOLD



WORLD'S PRODUCTION OF SILVER



to bore down through the strata in order to test the thickness and direction of the coal-measures. The bore-hole is usually begun by digging a small pit above 6 feet deep, and the old method was to pierce the rock by means of a cutting-tool attached to long rods and worked by a lever with hand-power. Various improvements on this slow method have been recently made, as where hydraulic or steam power is used to drive the boring-rods, and diamond drills employed instead of the steel tool. (See Boring). When this boring test has been found satisfactory the shaft is then sunk. One shaft not unfrequently intersects a number of workable coal-seams, these being generally separated by shale, sandstone, and limestone. Seams of coal vary in thickness from 2 inches up to 30 feet as in Staffordshire, or even to 90 feet as in a small coal area at Johnstone, near Glasgow. The coal having been reached, the mining engineer has to devise the safest and most economical method of cutting the coal and sending it to the surface. There are two commonly adopted methods of working out coal-seams, viz. the "pillar-and-stall" or "stoop-and-room" system, and the "longwall" or "longwork" system. The former method consists in excavating "rooms" in such a manner as to divide the coal into rectangular pillars or "stoops." In the early days of coal-mining the stalls were made large and the upholding pillars left small, no attempt being afterward made to recover the coal in these pillars. When the floor of the mine was of soft clay or lime the weight of the roof drove the pillars down, causing the floor to rise in the center between the pillars, and establishing an undulating movement throughout the underlying strata called by miners "the creep." To prevent this the coal is now left in wide barriers or "pannels" which divide one part of the workings from another. The pillars of coal which are now left are recovered by a second operation, which consists in cutting them out after a division or pannel has been excavated to its boundary or by working them out when the stalls have been driven the length of two or three pillars. These pillars are, in most cases, about 20 yards square, and in one panel of the mine there are often 600 such pillars. In the "longwall" method the miner cuts into, or "holes" into, the under part of the coal-bed for two or three feet, and then, with the aid of wedges driven in atop, he loosens and extracts the mass of coal which has been "holed." By this system the entire coal-seam is at once extracted, while the empty space or "goaf" is filled in with waste material as the work advances.

One of the most important matters connected with coal-mining is ventilation. To facilitate this there are two openings into the mine, which are technically called the "intake" and "return" air-passages. The necessary supply of pure air is maintained either by the natural heat of the mine causing a constant inrush of cold air; by pumps or fans forcing the air down the "downcast" shaft or drawing it up the "upcast" shaft; or by furnace ventilation. This

latter mode is considered the most efficient. The furnace by its heat causes a constant current up the upcast shaft, thus drawing the vitiated air away from the workings. Connected with ventilation is the dangerous accumulation of fire-damp which may take place in a mine, to guard against which safety-lamps have been introduced. See Fire-damp, Safety-lamp.

The pumping of water out of the workings is an essential part of mining. Some of the largest pumping engines raise from 2000 to 3000 gallons of water per minute. Air-engines are frequently in use for subterranean haulage and for driving the coal-cutting machines which are now to some extent, employed.

MINION, a size of type between brevier and nonpareil. See Printing.

MINISTERS, the name applied in politics to the chief servants of the state in the administration of its affairs, and the chief representatives of a country at a foreign court. The former are known collectively as the ministry, and the head of the administration is called the prime-minister or premier. All the ministers are appointed by the prime-ministers, subject to the approval of the crown.

MINISTERS, Foreign, are those accredited representatives which one country sends to another. Generally they are divided into three classes. The highest in rank is the ambassador extraordinary, who can claim to represent his state or sovereign in his own person, and receive honors and enjoy privileges accordingly. The legates and nuncios of the pope also belong to this class. Envoys extraordinary, internuncios, and ministers plenipotentiary belong to the second class, and neither hold the same degree of power nor receive the same distinction as the former. The third class includes ministers resident, envoys, and chargés d'affaires, the last being sometimes regarded as a fourth class. Persons who are sent merely to conduct the private affairs of their monarch or his subjects in a foreign place are called agents or residents; and where they are occupied chiefly with subjects of a commercial character they are called consuls. When the foreign minister is accredited directly to the sovereign of a state he can demand an audience, his person is considered inviolable, and he is freed from taxes and territorial restrictions. See Ambassador, Envoy, Consul.

MINK, an American and European quadruped, allied to the polecat. It is



Minks.

semi-aquatic, burrowing on the banks of rivers and ponds, living on frogs, crayfishes, and fishes, which it pursues in the water. It exhales a strong odor of musk, and its fur is in considerable request. The European and American minks are by some regarded as distinct species.

MINNEAPOLIS, a city of the United States, capital of Hennepin co., Minnesota, on both sides of the Mississippi, at the Falls of St. Anthony, 8 miles n.w. of St. Paul. It is regularly laid out with avenues 80 feet wide running east and west, having double rows of trees on each side.

Minneapolis stands on a gently undulating plateau, 800 feet above sea-level, in a picturesque lake region much frequented as a place of resort. There are several lakes within the city limits and of others in the immediate vicinity, Lake Minnetonka is the largest and most popular. An extensive park system has been developed. There are some twenty parks, comprising a proportionately large area of 1581 acres. Minnehaha Park, of 133 acres, is a picturesque tract, embracing the Falls of Minnehaha, 50 feet in height, which have been immortalized by Longfellow's Hiawatha. Adjoining the park are the beautiful grounds of the State Soldier's Home, occupying 60 acres. Minneapolis has many handsome edifices, both public and private. The court house and city hall was completed at a cost of more than \$3,000,000.

The principal industries are the manufacture of flour, engines, boilers, agricultural implements, carriages, wagons, and pork-packing. The city possesses a territory of about 33 sq. miles, with the celebrated falls of Minnehaha and several fine lakes.

Among the railroads that contribute to the high commercial and industrial rank of Minneapolis are: the Chicago and Northwestern; the Burlington Route; the Chicago, Milwaukee and Saint Paul; the Chicago, Rock Island and Pacific; the Northern Pacific; the Great Northern; the Minneapolis, Saint Paul and Sault Sainte Marie; the Chicago Great Western; and the Saint Paul and Duluth. The Mississippi river is navigable to Minneapolis, but vessels practically go no higher than Saint Paul. Pop. 300,000.

MINNESOTA, one of the United States of America, bounded north by Canada, east by Lake Superior and Wisconsin, south by Iowa, and west by the Dakotas; area, 83,360 sq. miles. The chief towns are Minneapolis, and the capital, St. Paul. This state occupies the summit of a central plateau formed by the conterminous basins of the Mississippi, the St. Lawrence, and Lake Winipeg. The surface is generally an undulating plain, with a general slope southeast toward the basin of the Mississippi, which, with its affluents, drains about two-thirds of the state. The Red river of the north, which forms part of the west boundary, also receives a part of the drainage, and part is carried by Rainy Lake river to the Lake of the Woods, part to Lake Superior. Lakes are numerous, including Leech lake, Red lake, Vermilion lake, Mille Lacs,

and part of Lake of the Woods and Rainy lake. Iron and copper are among the chief minerals. The soil for the most part is good, and the Red river valley is considered the finest wheat-growing district in the state. A large forest known as the "Big Woods" extends over the center of Minnesota for the length of 100 miles and a breadth of 40 miles, and the country, especially above lat. 46°, is well wooded with pine, spruce, oak, beech, elm, maple, while the prairies have been planted with millions of trees by the aid of state bounties. The climate is on the whole excellent, the winters, though cold, being clear and dry; and, the temperature being equable, the state has become a winter resort for invalids.

Although only a little over one-half of the land area is included in farms, the state has attained the first rank in



Seal of Minnesota.

the cultivation of certain crops. In the Red river valley wheat-growing has been extensively developed. With the introduction of modern methods the state mills became famous for the high quality of their product. The cultivation of wheat increased rapidly, and in 1890 the state had become first in both acreage and production. Oats has about a third as great an acreage as wheat, and ranks next to it in importance. Both corn and oats are grown most extensively in the southwestern part of the state. In barley and flaxseed raising also, the state takes a high rank, and increasing quantities of rye are produced. Hay and forage crops cover about one-half as great an acreage as is devoted to wheat. Large quantities of Irish potatoes are raised, and the cultivation of the sugar beet has been introduced. Fruit culture is mainly confined to the southern part of the state and is not yet extensively developed.

Minnesota is one of the richest states in forest resources, having a woodland area of about 52,200 sq. miles. Hardwood forests border the prairies, while farther north the white pine predominates, Norway pine and spruce being also abundant. The lumber industry has increased rapidly and it ranks third in importance. There is a forest reserve of 200,000 acres in Chippewa reservation.

Minnesota is favored with the advantages of both the Saint Lawrence and the Mississippi systems of naviga-

tion. The latter is becoming relatively less important owing to the development of railroads. Duluth has become one of the leading lake ports. It has immense shipments of ore, grain, and lumber. But few regions of the country are better supplied with railroads than are the southern and western parts of the state. Minneapolis-Saint Paul is the objective point of most of the great lines northwest of Chicago, and the transcontinental Great Northern and Northern Pacific crosses the state from east to west. Among the lines which have a large mileage in the state are the Chicago, Milwaukee and Saint Paul; the Chicago and Northwestern; the Chicago, Saint Paul and Omaha; the Eastern Railway of Minnesota; and the Minnesota and St. Louis. The total mileage has increased from 1092 miles in 1870 to over 7000.

By the state constitution a portion of land is set apart in each township to provide a perpetual education fund. The state university is at Minneapolis. The state sends two senators and three representatives to the national congress.

The first European to visit the region now included within the state was Duluth, who, in 1678, built a fort at the mouth of the Pigeon river, on the north shore of Lake Superior. In 1680 the Falls of Saint Anthony were discovered by Louis Hennepin, a Franciscan priest. Before 1700 there were trading posts situated on Lake Pepin and on the Minnesota river. Minnesota formed a part of the extensive territory ceded by France to Great Britain in 1763. In 1766 it was explored by Capt. Johnathan Carver, of Connecticut. In 1783 it became a possession of the United States. The exploring expedition of Lieutenant Pike in 1805 was followed by many others within the succeeding forty years; and with an increased knowledge of the country came the first important beginning of immigration. The Indian titles to the lands east of the Mississippi were not extinguished until the year 1838, and it was not until March 3, 1849, that the territory of Minnesota was organized, with the Missouri river as its western boundary. In 1851 the Indian titles to the lands (except reservations) between the Mississippi and the Red River of the North were extinguished, and immigration increased rapidly. On May 11, 1858, Minnesota was admitted as a state. In 1862 the Sioux Indians, under Little Crow, angered at the continuous inroads made upon their lands, attacked and destroyed many of the frontier settlements. Over 500 white settlers and soldiers were killed and 25,000 people were driven from their homes. Legislation after the civil war was concerned largely with the regulation of railway corporations.

Since 1860 Minnesota has been steadily republican, save for the election of 1898, when the democrats, populists, and silver republicans elected their candidate for governor. Pop. 2,125,000.

MINNESOTA RIVER, a river in the United States, which flows through Minnesota and falls into the Mississippi 5 miles above St. Paul; length, 470 miles.

MINNESOTA, University of, a co-

educational state institution of higher learning in Minneapolis, Minn., established in 1851. Its government is vested in a board of thirteen regents, nine appointed by the governor of the state and holding office for six years, and three ex-officio members, the governor, the state superintendent of public instruction, and the president of the university. The annual income of the university is now, 1906, about \$510,500, received from various sources, as follows: Permanent endowment fund, \$53,000; Hatch and Morrill bills, \$40,000; state tax of $\frac{3}{100}$ of a mill, \$194,000; annual state appropriation, \$69,500; fees, \$126,000; miscellaneous sources, \$28,000. It provides courses in general college work, engineering, mining, chemistry, agriculture—including forestry, home economics, short practical course in agriculture and dairying, law, medicine—including homeopathic medicine, dentistry, pharmacy, leading to appropriate degrees. The faculty numbers 350; students 4,000; alumni 6148; buildings 35, valued at \$2,200,000; campus 50 acres on east bank of Mississippi river well wooded with native oaks, valued at \$300,000; experimental farm 200 acres, valued at \$400,000, and substations valued at \$30,000. Co-educational in all departments.

MINNOW, a species of fish belonging to the same genus as the carp. They swim in shoals, seldom exceed 3 inches in length, and make excellent bait for trout. In America various small fish receive this name.

MINOR, a person of either sex under age, who is under the authority of his parents or guardians, or who is not permitted by law to make contracts and manage his own property. See Age.

MINOR, in Music. See Major.

MINOTAUR, in Greek mythology, a monster fabled to have had the body of a man with the head of a bull, and to have fed on human flesh, on which account Minos shut him up in the labyrinth of Dædalus, and at first exposed to him criminals, but afterward youths and maidens yearly sent from Athens as a tribute. He was slain by Theseus.

MINSK, a town of Russia, capital of government of same name. Pop. 91,494. The government, which has an area of 35,290 sq. miles, has extensive forests and great stretches of marsh or swamp. Pop. 2,156,123.

MINSTREL, a singer and musical performer on instruments. In the middle ages minstrels were a class of men who subsisted by the arts of poetry and music and sang to the harp or other instrument verses composed by themselves or others. The person of the minstrel was sacred; his profession was a passport; he was "high placed in hall, a welcome guest." So long as the spirit of chivalry existed the minstrels were protected and caressed but they afterward sank to so low a level as to be classed, in the reign of Queen Elizabeth, with beggars and vagabonds.

MINT, the name given to several aromatic plants. They are nearly all perennial, having square stems which bear opposite and simple leaves; they are widely distributed throughout tem-

perate regions; and they abound in resinous dots which contain an essential oil. Mint has an agreeable odor, and partakes in the highest degree of tonic and stimulating properties. Spearmint is generally used, mixed with vinegar and sugar, in sauce. Peppermint yields the well-known stimulating oil of the same name. Pennyroyal is used for the same purposes as peppermint.

MINT, the place where a country's coinage is made and issued under special regulations and with public authority. In England there was formerly a mint in almost every county; the sovereign, barons, bishops, and principal monasteries exercised the right of coining and it was not till the reign of William III. that all the provincial mints were abolished. The present mint on Tower Hill, in London, was erected between the years 1810 and 1815. In former times the coinage was made by contract at a fixed price. The English mint supplies the whole of the coinage of the British Empire, except Australia and the East Indies, which are supplied from branch mints at Sydney, Melbourne, Calcutta, and Bombay. In the United States, there are mints at Philadelphia, San Francisco, Carson, and New Orleans. In France, as in England, the number of mints was at one time considerable. See Coining.

MIN'UET, a slow graceful dance said to have been invented in Poitou, in France, about the middle of the 17th century, performed in $\frac{3}{4}$ or $\frac{3}{8}$ time. The term is also applied to a tune or air to regulate the movements in the dance, or composed in the same time.

MINUS, in algebra, the term applied to the negative or subtractive sign $-$, which, when placed between two quantities, signifies that the latter is to be taken from the former; thus $a - b$ (called a minus b) signifies that b is to be subtracted from a. Quantities which have the sign minus before them are called negative or minus quantities; as, $-xy$, -5 ed.

MIN'UTE, a division of time and of angular measure. As a division of time it is the sixtieth part of an hour. As a division of angular measure it is the sixtieth part of a degree. In astronomical works minutes of time are denoted by the initial letter m, and minutes of a degree or of angular space, by an acute accent ($'$).

MI'OCENE, in geology, the name given by Sir Charles Lyell to a subdivision of the tertiary strata. The terms Miocene and Pliocene are comparative, the first meaning less recent and the other more recent. The Miocene strata contain fossil plants and shells which indicate a warm climate. The mammals are important, and foreshadow the animal life of the present day. No strata of Miocene age occur in the British Isles.

MIRABEAU (mē-rā-bō), Gabriel Honoré Riquetti, Comte de, French statesman, born in 1749 at Bignon, near Nemours; died at Paris April 2, 1791. At an early age he manifested extraordinary intelligence; but his youth was a stormy and licentious one, so much so that on several occasions he was imprisoned by his father under a lettre de

cachet. It was during an imprisonment at Vincennes, which lasted three years and a half, that he wrote his *Lettres à Sophie*, *Lettres de Cachet*, and *L'Espion Dé-valisé*. On his release from this prison he lived for some time in Holland and England, returning to France in 1785. On the assembling of the states-general Mirabeau, elected for Aix, soon became prominent. When the king required the tiers état to vote apart from the other two orders it was Mirabeau who counseled resistance, demanded the withdrawal of the troops, consolidated the national assembly, and defied the king's orders. For some months he continued to lead, but he soon found that



Mirabeau.

the members of the assembly were mostly impracticable and inexperienced men, whose chief function was to discuss an ideal constitution. As a practical statesman Mirabeau desired action, and for this reason he attempted to form alliances with Lafayette, the Duke of Orleans, Necker, and finally with the queen. Correspondence with the latter was maintained through La Marck, and he received a subsidy from the royal party. No practical result followed from this secret alliance, for the queen rejected Mirabeau's counsel and suspected his methods of government. Whether he might ultimately have been able to guide the revolution into peaceful ways has always been a matter of conjecture to historians, but this possibility was prevented by his death in 1791. This was regarded as almost a national calamity, and the people buried him with splendid pomp in the Pantheon.

MIRACLE, a suspension of, or deviation from, the known laws of nature, brought about by the direct interference of a supreme supernatural Being. It is in its nature, as the term applies, an occurrence which is strange, marvelous, inexplicable, and is usually connected with some ulterior moral purpose. By the elder theologians a miracle was conceived to be the triumph of the Divine Will over the work of His hands and the laws of His making. In modern exegesis, however, the miraculous element is not considered to give evidence of opposing forces. On the contrary, a miracle is explained as a manifestation of the Divine Power working through laws and by methods unknown to us, and which,

upon a higher plane, are altogether natural and orderly.

MIRAGE (mi-rāzh'), an optical illusion, occasioned by the refraction of light through contiguous masses of air of different density; such refraction not unfrequently producing the same sensible effect as direct reflection. It consists in an apparent elevation or approximation of coasts, mountains, ships, and other objects, accompanied by inverted images. In deserts where the surface is perfectly level a plain thus assumes the appearance of a lake, reflecting the shadows of objects within and around it. The mirage is commonly vertical, that is, presenting an appearance of one object over another, like a ship above its shadow in the water. Sometimes, however, the images are horizontal. Looming is a phenomenon of the same nature, in which the objects appear to be lifted above their true positions, so that an observer sees objects which are beyond the horizon. The cause is in both cases the same, for while the mirage is produced in most instances by reflection from the desert sand, looming is occasioned by reflection from the sky. The phenomenon called Fata Morgana which is sometimes seen on the Calabrian coast is a kind of mirage. By it men and animals apparently of immense size may sometimes be seen presented in the air.

MIRROR, a smooth surface capable of regularly reflecting a great proportion of the rays of light that fall upon it. The mirrors used by the ancients, and more especially by the Etruscans, were made of thin polished bronze. Small metal mirrors were also used by the Greeks and Romans, and specimens brought by the latter have been found in Cornwall. The making of glass mirrors, which had their backs silvered with an amalgam of mercury and tin, was early practiced by the Venetians. In 1835 Liebig observed that by heating aldehyde in a glass vessel along with an ammoniacal solution of nitrate of silver, a coating of brilliant metallic silver was left upon the glass. This has now been made use of in mirror-making by what are known as the hot and cold processes. In the hot process the glass is first sensitized with a solution of tin, which is then rinsed off and the plate laid upon a flat, double-bottomed metal table heated by steam to about 100° Fahr. In this position a solution of nitrate of silver, ammonia, and tartaric acid in distilled water is poured over it; and if the temperature is kept uniform a thick deposit of silver will be formed in about half an hour. When the silver layer is carefully wiped this process is repeated. In the cold process a solution of nitrate of silver, nitrate of ammonium and caustic soda dissolved in water, is mixed with a solution of loaf-sugar, vinegar, and water. This is poured quickly and evenly over the glass plate, and the silver is precipitated in a few minutes, after which it is washed and the process repeated. The silvering is then protected by a coating of shellac or copal varnish. More recently a solution of bichloride of platinum is applied to the surface of the glass and precipitated with oil of lavender in the manufacture

of the cheapest mirrors. Mirrors may be plane or spherical, and in the latter case they may be either convex or concave. The optical principles involved in reflection from mirrors are simple.

MIRZAPUR, a city of India, capital of a district of same name, in the United Provinces, on the Ganges, 56 miles below Allahabad and 45 above Benares. Pop. 79,862.—The district has an area of 5223 sq. miles. Pop. 1,161,508.

MISDEMEANOR, an offense of a less atrocious nature than a crime, including generally all indictable offenses which do not amount to felony, as perjury, libels, conspiracies, assaults, etc.

MISERE'RE, the name of a psalm in the Roman Catholic church service, taken from the fifty-first Psalm, beginning in the Vulgate, "Miserere mei, Domine" ("Pity me, O Lord"). The name is also applied to a projecting bracket on the under side of a hinged seat in a stall of a church; or to the seat and bracket together. The bracket served as a rest for a person standing, the seat being turned up.

MISSIONS, Missionaries. The first Christian missionaries were the apostles, and by them and their successors Christianity was in the course of a few centuries spread over all parts of the Roman Empire. In some parts, as in Britain, it gave way again before the Germanic invaders of the 5th and 6th centuries, and some of the most noted missionaries were those who reintroduced their faith among the German tribes. St. Augustine or Austin, who was sent by Gregory the Great with forty associates to preach the gospel among the Saxons of Britain at the end of the 6th century, was the first of this missionary group. Britain in its turn sent forth missionaries, such as St. Boniface, "the apostle of Germany." Germany also sent out the missionaries who converted Denmark, Sweden and Norway, Poland, Hungary, and Bohemia. The Crusades opened up new spheres for missionary efforts in the east, and two religious orders founded at the beginning of the 13th century, the Dominicans and Franciscans, devoted themselves to preaching among the Musselmans. Others advanced as far as Tartary, Tibet, and China, but the persecutions there became so violent that those countries had to be abandoned. A new impulse was given to missions by the discovery of the New World. When the way had been prepared by the Spanish and Portuguese armies a crowd of friars of all orders set out for the West Indies, Mexico, Peru, and Brazil, to spread Catholicism; but very few, like Las Casas, protected the natives from rapacity or preached Christianity by their conduct. The powerful order of the Jesuits, which was founded in the 16th century, turned their attention to the east, and the celebrated Francis Xavier, a member of the order, proceeded to India, where his efforts were crowned with success. From India Christianity was introduced into Japan, where it had to contend against terrible persecutions, before which the missionaries were compelled to retire. Father Ricci, another Jesuit, penetrated to Peking, and suc-

ceeded about the end of the 16th century in gaining a firm footing. At the beginning of the 17th century some Dominican missionaries made Tonquin and Cochin China the center of their efforts, and pushed out thence into all the neighboring countries with considerable success. In 1622 Gregory XV. gave a better organization to the Roman Catholic missions by the foundation of the Propaganda, and they are now very widely spread and carried on with much energy.

The earliest Protestant foreign mission appears to have been one which was established in Brazil in 1555. Gustavus Vasa, king of Sweden from 1523 to 1560, toward the close of his reign sent forth a mission to convert the Laplanders. Shortly after the settlement of New England in 1620 John Eliot took a deep interest in the condition of the North American Indians, and in 1646 began a regular mission among that people. But these were only isolated trivial efforts, and it was not until the 18th century that the true missionary spirit awoke. The English took the lead in this movement, but were speedily followed by Danes and Germans, especially the Moravian Brethren. After the missions of Great Britain the next in importance are those of the United States. The first missionary society of this country was founded in 1810 under the title of the American Board of Commissioners for Foreign Missions. The American Baptist Missionary Union was founded in 1814, the Methodist Episcopal Church Missionary Society in 1819, the Protestant Episcopal Missionary Society in 1820, the Presbyterian Board of Foreign Missions in 1833. The American missionaries have naturally done much in the conversion of the Indians of this continent, but their missions are widely spread elsewhere.

MISSISSIPPI ("Great Water"), the principal river of North America, and one of the largest rivers in the world. It has its source in Lake Itasca, state of Minnesota, whence it issues about 12 feet wide and 2 feet deep; from thence it trends southward through a number of lakes and over a series of rapids until the Falls of St. Anthony are reached; below this it receives the Iowa, the Illinois, and the Missouri as tributaries, but the latter is really the main stream, having a length of 2908 miles before the rivers unite, while that of the Mississippi is only 1330 miles. From St. Louis, a little below their confluence, the Mississippi becomes a broad, rapid, muddy river, liable to overflow its banks; lower down it receives in succession the Ohio, Arkansas, and Red rivers, and it finally enters the Gulf of Mexico through a large delta with several "passes," some distance below New Orleans. The combined lengths of the Missouri and Mississippi are about 4200 miles; the whole area drained by the Mississippi is 1,246,000 sq. miles; the maximum flood volume reaches 1,400,000 cubic feet per second below the Ohio; and the sediment transported to the gulf annually would make a solid block 1 mile square and 260 feet high. Above its junction with the Ohio at Cairo the river enters upon a large

alluvial basin, bounded on both sides by high bluffs, and through this plain the river winds for about 1150 miles. The volume is usually smallest in October and greatest in April, and the low-lying lands are subject to terrible floodings during the spring freshets. At many places attempts have been made to secure the river within its banks and save the country from loss and suffering by building dykes, or levees as they are called. The sediment carried down, however, is continually raising the bed of the river, and thus breaks are frequently made in these levees. A recent method of improving the river's course, sanctioned by congress and superintended by Captain Eads, is to construct light willow screens or dams on the shoals and at the wide places on the river where bars already exist. By this a deposit is formed which in time will act as a bank to hem in the river, while the increased volume thus obtained will help to scour out a deeper channel. The most important towns on the river banks are St. Paul, St. Louis, Cairo, Memphis, Vicksburg, Natchez, and New Orleans.

MISSISSIPPI, one of the United States of America; bounded north by Tennessee, east by Alabama, south by the Gulf of Mexico and Louisiana, and west by Louisiana and Arkansas; area, 46,810 sq. miles. The Mississippi winds along its western frontiers for 530 miles. Near the Gulf of Mexico the country is low and swampy, the central part is hilly and mostly prairie-land, a large part of the northeast is covered with forests, while 7000 sq. miles along the Mississippi consist of rich bottom-lands. This river



Seal of Mississippi.

receives the far larger part of the drainage. In the north the climate is tolerably mild and agreeable; but in the south, below lat. 13°, and along the swampy basin of the Mississippi, it is both extremely hot and unhealthy. In the southeast, where the pine forests extend, the soil is light and comparatively barren, but large tracts of it are well adapted for pasture. In the northwest, on the borders of the Yazoo, the soil is composed of rich black mould; and in the Mississippi bottom-lands, where it is protected from inundation by embankments or levees, it is of remarkable fertility. The staple of the state is cotton, and the other crops are chiefly Indian corn, bananas, sweet-

potatoes, tobacco, and indigo; while fruit is abundant. The predominant industry in the state is agriculture and it is highly favored both by the nature of the climate and the soil. The most desirable region is included between the Yazoo and the Mississippi rivers. Very extensive areas are still covered with forests, but it is nearly all susceptible of cultivation. There are 18,240,736 acres, or 61.5 per cent of the total area, included in farms. Of this 41.6 per cent is improved, the improved area having increased about 1,500,000 acres since 1860, while the unimproved area remains about the same. The change in the system of agriculture incident upon the cessation of slavery has decreased the average size of farms from 369.7 acres in 1860 to 82.6 in 1900. In no other state is cotton so dominant as in Mississippi. The acreage of cotton is over half of the total crop acreage and contributes 63.6 per cent of the value of farm crops. The state ranks third in the production of cotton. The greatest production was reached in 1897-98, when the output amounted to 1,600,000 bales, and only once in that decade did the production fall below 1,000,000 bales. Aside from cotton the agricultural interest of the state is almost wholly centered in corn. The acreage of this crop constitutes 95.9 per cent of the total area devoted to cereals. The production of oats has decreased. Compared with its sister state across the Mississippi river, remarkably little attention is paid to the growing of sugar cane, and the crop of late years is almost wholly converted into syrup and molasses. Small fruits and orchard fruits are not extensively raised. In the decade 1890-1900, however, the number of trees almost doubled. In the latter year the peach trees numbered 1,856,748 which was 53 per cent of the total number.

The manufacturing industry is probably less developed in Mississippi than in any other of the older states of the Union. On the other hand, the rate of the recent increase has been greater than that of most of the other states. In the decade 1880-1890 the value of the manufactured product increased 148.8 per cent and in the decade 1890-1900 increased 116.1 per cent. Having no large transportation center, and the water power and mineral resources being of little consequence, the state is at a comparative industrial disadvantage. But the products of her cotton fields and forests supply an abundance of raw materials.

The manufacture of cottonseed oil and cake—experienced an increase during the decade of 177.6 per cent. The state contained the first mill of this kind erected in the United States. A less absolute but much larger per cent of increase was made in cotton-ginning. The export trade, carried on through New Orleans and Mobile, is chiefly in lumber and cotton, while the river and coasting traffic is large. The railroads extend to about 2500 miles. The state supports a public school system with separate schools for the white and colored races, besides a state university

and other schools of high grade. The capital is Jackson. The other principal towns are Vicksburg and Natchez.

In 1539 Hernando de Soto, with a band of Spanish adventurers, crossed the northeastern part of what is now the state, and in the early part of 1541 reached the Mississippi river, near the present site of Memphis, Tenn. In 1673 the French explorers Joliet and Marquette, passing down the Mississippi, sailed as far as the mouth of the Arkansas. In 1681-82 La Salle sailed down the river to its mouth, and, taking formal possession for the king of France, Louis XIV., named the country Louisiana after him. The first attempt to found a colony was made in 1699 by Iberville, who brought 200 immigrants from France to Biloxi, on the eastern shore of the Bay of Biloxi.

By the treaty of Paris, in 1763, France ceded all her possessions east of the Mississippi river to England, excepting the island of New Orleans, ceded to Spain. The British province of West Florida at first extended eastward from the Mississippi river along the Gulf coasts, with its northern limit at the 31st parallel of north latitude. Soon afterward the northern boundary was fixed at a line drawn eastward from the point where the Yazoo river unites with the Mississippi.

During the revolutionary war of the Atlantic colonies, West Florida remained undisturbed until 1779. In 1781 West Florida was conquered by Spain. In 1798, the territory was extended from the Mississippi river eastward to the Chattahoochee river. By the treaty of 1795 Spain ceded her claims to the United States. In the war of 1812 the territory was well represented at the battle of New Orleans. In March, 1817, congress passed an enabling act for the admission of Mississippi to the Union and the state was formally admitted December 10, 1817. The most notable features of the first constitution of Mississippi were the high property qualifications for holding office, the short tenures of offices, and the large appointing power of the governor and legislature. The first governor was David Holmes, and during his administration the capital was permanently located at Jackson, near the headwaters of the Pearl river. Upon the outbreak of the Mexican war Mississippi was called upon to furnish one regiment of volunteers, but more than enough men for two regiments responded. The first regiment was commanded by Col. Jefferson Davis, who won great distinction at the battle of Buena Vista. In 1851 occurred the first important struggle in Mississippi over the slavery question, which had become serious on account of the enactment by congress of the so-called Compromise Measures of 1850. It was left, however, for the election of Lincoln to bring the secession movement to a head. An ordinance of secession was passed on January 9, 1861, by a convention, by a vote of 84 to 15, and the state constitution was amended to bring it into conformity with the constitution of the confederate

states. In 1870 the state was re-admitted into the Union. By the constitution of 1890 the suffrage was restricted to those able to read a section of the constitution, or to interpret any passage, if read aloud, a provision aimed against the negro voter, and sufficiently successful in attaining its aim. In national elections Mississippi has been a democratic state with the exception of the year 1840, when it voted for the whig candidate, and of 1872, when its vote was given to Grant. In 1864 and 1868 its vote was not counted. Pop. 1,750,612.

MISSISSIPPI, University of, a state university chartered in 1844 and opened in 1848, at Oxford, Miss., and maintained until 1880 by annual grants by the legislature. In 1872 the policy of separate schools, with optional studies and with courses leading to other degrees besides that of B.A., was adopted. The work of the university is organized in seven undergraduate courses, partially elective, leading to the bachelor's degree in arts, science, pedagogy, philosophy, mining, and both civil and electrical engineering. The university also maintains a law school and a summer school, and confers the degree of M.A. and Ph.D. In 1894 the preparatory education was discontinued at the university; and the requirements for admission are those adopted by the Association of Colleges and Preparatory Schools of the Southern States, of which the university is one of the original members. Students from approved high schools are admitted without examination. Since 1882 women are admitted to the classes, but are not permitted to lodge on the campus.

MISSISSIPPI AGRICULTURAL AND MECHANICAL COLLEGE, a state institution at Agricultural College, Miss., founded in 1880 on the federal land grant of 1862. It has a preparatory department and three courses of instruction, agricultural, mechanical, and textile, with provision for graduate work and summer sessions. It confers the degrees of Bachelor and Master of Science, and the honorary degree of Master of Progressive Agriculture. Tuition is free to students residing in the state; others pay an annual fee of \$20. The college has a military organization, and all students are required to wear a prescribed uniform within five miles of the college buildings. The attendance of women is permitted.

MISSISSIPPI SCHEME, a bubble scheme projected by John Law at Paris in 1717. Part of the scheme was for the colonization and development of the Mississippi valley, but combined with this there was a banking scheme and a scheme for the management of the national debt, the whole being supported by the French government. Such were the hopes raised by this undertaking that the shares originally issued at 500 livres (say \$100) were sold at ten, twenty, thirty, and even forty times their value. People came from all parts of France, and even from foreign countries, in order to invest in the company, and there was a general mania of speculation. The state took advantage of the popular

frenzy to issue increased quantities of paper-money, which was readily accepted by the public creditors and invested in shares of Law's company. This went on till the value of the paper-money became depreciated in value and all the shares fell in price. All attempts to check the downward course failed, and when Law, the originator of the bankrupt company, fled from France in 1720 the state acknowledged itself debtor to the shareholders to the extent of 1700 million livres. See Law, John.

MISSOURI (mi-sō'rē), a river of North America, which is formed in the Rocky Mountains, in Montana, winds circuitously along the base of the mountains, then east till it reaches the western boundary of N. Dakota, and receives the Yellowstone. Here it begins to flow southeastward through N. and S. Dakota, then forms the eastern boundary of Nebraska, separating it from Iowa and Missouri; separates for a short distance Kansas from Missouri, then strikes eastward across the latter state, and joins the Mississippi after a course of 2908 miles. It is navigable 2500 miles from the Mississippi. Its affluents are very numerous on both banks, but by far the most important of them are the Yellowstone, the Nebraska or Platte, and the Kansas, all from the west.

MISSOURI, one of the United States of America, bounded north by Iowa; east by the Mississippi, which separates it chiefly from Illinois, but partly also from Kentucky and Tennessee; south by Arkansas; and west by Kansas and Nebraska, from which it is partly separated by the Missouri, and by the Indian Territory; area, 69,415 sq. miles. The surface is traversed by numerous hills and swelling ridges, but the southeast corner is almost an alluvial flat. The

attention given to corn, which constitutes over 71 per cent of the total cereal crop, and places Missouri among the leading corn states. Wheat is the next most important of the cereals. A largely increasing acreage is devoted to hay and forage, which together rank next to corn in area. A great deal of flax is raised near the western border of the state south of the Missouri river. In the lowlands in the southeast corner of the state, cotton is the leading crop. Potatoes and sorghum cane are grown throughout Missouri. The state produces watermelons, tomatoes, cabbages, and other vegetables. Broom corn and castor beans receive some attention. Both small fruits and orchard fruits are grown in abundance.

Red deer are found in every part of the state, especially in the thinly settled and mountainous districts. Wild turkeys are numerous in the swampy and mountainous districts, and are found in all parts of the state. Prairie chickens are found in the prairie portion of Missouri, and are shipped in great quantities to eastern markets. And in all parts of Missouri are found the quail or Virginia partridge. The rabbit, a species of hare, is so common as to be considered a pest. The gray squirrel and the red fox-squirrel are also found in large numbers all over the state. Black bass, perch, catfish, buffalo fish, suckers, and pike are the leading varieties of native fish.

Missouri is the leading manufacturing state west of the Mississippi. Development in this direction has been favored by its location on the Mississippi and Missouri rivers. The growing of tobacco in the state gives rise to extensive manufactures of this product, especially chewing and smoking tobacco and snuff. A large number of railroads cross the Mississippi at St. Louis, while Kansas City and St. Joseph on the western border are also large railroad centers. Some of the leading lines in Missouri are: The Missouri Pacific, the Atchison, Topeka and Santa Fe, the St. Louis and San Francisco, St. Louis Southwestern, the Chicago, Burlington and Quincy, Chicago and Alton, the Wabash, the St. Louis, Iron Mountain and Southern. The climate is generally healthy, but subject to extremes. Education has been well provided for, both by the state and by the different religious bodies. Besides the state university there are other universities and colleges (medical and other), normal schools, school of agriculture, school of mining and metallurgy, etc. Jefferson City is the capital, but St. Louis is the commercial metropolis and largest city, and there are many others more populous than Jefferson.

Missouri was part of the vast area of Louisiana claimed by the French on the ground of the discoveries of La Salle, who descended the Mississippi to its mouth in 1681-82. A few years before La Salle, in 1673, Marquette and Joliet had sailed down the river as far as the mouth of the Arkansas. The territory included within the present state was traversed before 1720 by parties of French explorers in search of mines of

lead and silver, and in 1723 a certain Lieutenant Renaud received the grant of a large tract of land in that region. The foundation of Old Saint-Genève is sometimes placed in the year 1735. The second settlement within the state was St. Louis, established as a trading-post in 1764, a year after the cession of Louisiana to Spain by the Peace of Paris. After the acquisition of Louisiana by the United States, in 1803, the entire territory was divided into two by the line of the 33d parallel of latitude, the northern part being known as the district and territory of Louisiana till 1812 and subsequently as the territory of Missouri. In June, 1812, Missouri was organized as a territory, with a governor and general assembly. In 1818 Missouri applied for admission to the Union as a state. Two years of bitter controversy followed a resolution introduced into Congress of an anti-slavery restriction. This was settled by the adoption of the "Missouri compromise," which forbade slavery in all that portion of the Louisiana purchase lying north of 36° 30' except in Missouri, and on July 19, 1820, Missouri was admitted to the union.

In the first half of the nineteenth century Missouri, though a slave state, was not an ardent defender of slavery, and a very large proportion of its citizens were interested in movements looking toward the gradual emancipation of the slaves. With the rise of the abolitionists, however, Missouri became decidedly a pro-slavery state. It favored the annexation of Texas in 1845, and took a very prominent share in the Mexican war, General Kearny's army of invasion consisting largely of Missourians. In 1849 the legislature adopted the so-called Jackson resolutions, in which the right of congress to regulate slavery in the territories was denied, and the principle of squatters' sovereignty was asserted. In reply to President Lincoln's call for troops, Governor Jackson, who, with the rest of the state government, was in favor of secession, refused to participate in the "unholy crusade," and summoned the state militia to arms. Between the state militia and the federal troops, under Colonel Lyon aided by the volunteer bands which the loyalists of St. Louis had organized, civil war ensued. The governor, together with a majority of the legislature, fled to the southern part of the state, and the supreme power was assumed by the convention, which declared all the offices vacant and proceeded to install a provisional government. With the fall of the confederate power in Missouri the regular state government was reorganized (1864), and in January, 1865, a constitutional convention controlled by the radical union party assembled in St. Louis. Since the war the prosperity of the state has been greatly increased by the development of its mineral industries, and the growth of railroads. The improvement of the navigation of the Mississippi and the Missouri was carried on actively for many years. In the matter of public education there has been exceedingly rapid progress, the



Seal of Missouri.

most important rivers are the Mississippi and the Missouri, the latter of which crosses the state from west to east, and has several navigable tributaries—the Lamine, Osage, Gasconade, the Grand, and Charlton. The state is rich in minerals: iron and lead are produced, the latter in large quantities, and coal is raised to the extent of some 4,000,000 tons annually. Much of the soil is fertile, and there is a great deal of valuable timber.

Agriculture is the leading industry, 33,997,873 acres, or 77.3 per cent of the total area is included in farms. The crop production is characterized by the great

school fund of the state being one of the largest in the Union. In 1903 an exposition was held at St. Louis to commemorate the one hundredth anniversary of the acquisition of Louisiana.

From 1824 to the civil war Missouri was always democratic, but the whig minority was very strong. From 1864 to 1872 the republicans were in power, but the defection of a large body of liberal republicans who were opposed to the vindictive policy pursued against those who had participated in the rebellion led to the reestablishment of democratic supremacy, which has remained unbroken since, save for the election of 1894, when the republicans secured a majority in the legislature and the congressional delegation. Pop. 3,575,862.

MISSOURI COMPROMISE, an act of the American congress, passed in 1820, by which Missouri was admitted into the Union as a slave-holding state but which enacted that slavery should never be established in any future-formed state north of lat. 36° 30'.

MISSOURI, University of, at Columbia, in Boone county, is the oldest state university west of the Mississippi river. Its legal existence dates from Feb. 11, 1839, and the beginning of its courses of instruction from April 14, 1841. The organization of the university comprises nine departments: The college of liberal arts; the Missouri teachers' college, the college of agriculture and mechanic arts (including the experiment station), the college of engineering, the Missouri school of mines (at Rolla), the department of law, the department of medicine, the Missouri state military school, and the graduate department. All, excepting the military school, are open to women. 178 professors, assistant professors, instructors, and assistants were engaged in teaching in the various faculties in 1906. Forty-five states and eighteen foreign countries were represented in 1905-6 by 2,067 students, an increase in attendance of more than 100% since 1901, when the enrollment first reached 1,000. No tuition is charged and the cost of living is comparatively low. Excellent laboratory facilities exist and in the various general and special libraries more than 120,000 books and pamphlets are accessible to students. The buildings, grounds, books, and other equipment are valued at \$2,000,000, and the income of the university in 1905-6 was \$510,000. There are 30 buildings—23 at Columbia and 7 at the School of Mines at Rolla.

MISTLETOE, a plant growing parasitically on various trees, and celebrated on account of the religious purposes to which it was consecrated by the ancient Celtic nations of Europe, being held in great veneration by the Druids, particularly when it was found growing on the oak. It is a small shrub, with sessile, oblong, entire, somewhat leathery leaves, and small, yellowish-green flowers, the whole forming a pendent bush covered in winter with small white berries, which contain a glutinous substance. It is common enough on certain species of trees, such as apple and pear trees, hawthorn, maple, lime, and other

similar trees, but is very seldom found on the oak. Its roots penetrate into the substance of the tree on which it grows, and latterly it kills the branch supporting it.

MISTRAL, a violent cold northwest wind experienced in Provence and other neighboring districts bordering on the Mediterranean, and destroying crops, fruit, blossom, etc. It blows with greatest violence in autumn, winter, and early spring.

MITCHEL, Ormsby McKnight, American astronomer, was born in Kentucky in 1809. He was assigned to the artillery, and until 1832 was assistant professor of mathematics in the United States military academy. He resigned from the army and became professor of mathematics, philosophy, and astronomy in Cincinnati College in 1836. In 1844 he succeeded in obtaining the construction of an observatory in Cincinnati, of which he was made first director. During his incumbency of this office, which extended over many years, he made many notable astronomical discoveries, including, with exactness, that of the period of rotation of the planet Mars, and in 1859 he took charge of the Dudley University in Albany, N. Y. He was promoted major-general of volunteers in 1862. He died in 1862.

MITCHELL, Donald Grant (Ik Marvel), American author, was born in Norwich, Conn., in 1822. In 1850 and 1851 he wrote *Reveries of a Bachelor*, and *Dream Life*, the books most popularly associated with his pseudonym, Ik Marvel. In 1848 he again went abroad, traveling through Great Britain, France, and Switzerland, and on his return published *The Lorgnette*, a periodical in the manner of Irving's *Salmagundi*. In May, 1853, Mr. Mitchell was appointed United States consul at Venice, and on his return, in 1855, settled on a farm near New Haven, Conn. In 1876 he received the degree of LL.D. from Yale. He died in 1907.

MITCHELL, John, labor representative, was born in Braidwood, Ill., in 1869. He worked in the coal mines of Illinois and joined the Knights of Labor in 1885. He was secretary and treasurer of United Mine Workers in 1895, national vice-president in 1898. He was elected vice president of the American Federation of Labor in 1900. He was president of the United Mine Workers from 1898, to Jan. 1903. He directed the strike of the anthracite workers, and brought it, through the intervention of President Roosevelt, to a successful conclusion. He is one of the most prominent labor representatives in the United States. In 1902 he was appointed a member of the executive committee of the Industrial Department of the National Civic Federation.

MITCHELL, Margaret J. (Maggie), American actress, was born at New York City about 1832, and made her first appearance when a child on the stage of the old Bowery theater. She became prominent as a soubrette during 1852, and later acquired a national reputation in *Fanchon the Cricket*, of which

she is the original. She has played with great success *Little Barefoot*, *The Pearl of Savoy*, and other dramas adapted to the requirements of her particular school.

MITCHELL, Silas Weir American neurologist, was born in Virginia in 1829. His earliest work of importance consisted of researches upon the chemical composition and physiological action of venom snakes. He system of "Rest Treatment" has been adopted the world over. He is best known to the public through his novels, *Hugh Wynne*, *Free Quaker*, *The Adventures of François*, *Dr. North and His Friends*, etc.

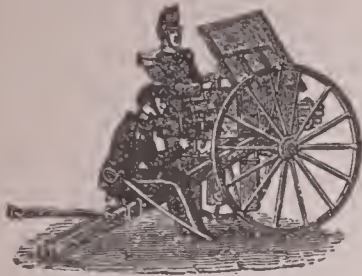
MITE, a name common to numerous small, in some cases microscopic, animals. Sometimes the name is given only to those of the Acarida which have feet formed for walking and the mouth not furnished with a sucker formed of lancet-like plates, as in the ticks, but with mandibles. Some are of a wandering character, and are found under stones, leaves, the bark of trees; or in provisions, as meal, cheese, pepper, etc.; others are stationary and parasitic on the skin of various animals sometimes proving of serious injury to them.

MITFORD, Mary Russell, English authoress, daughter of a physician at Alresford, Hampshire, and born there 1786, died 1855. Her best-known work is *Our Village*, a series of prose sketches descriptive of English country life and scenery, drawn from the village of Three Mile Cross, near Reading.

MITHRIDATES, or **MITHRADATES**, king of Pontus, on the southern shore of the Black Sea, surnamed the Great. His father was murdered B.C. 120, and Mithridates ascended the throne at the age of thirteen. Soon after attaining his majority he commenced his career of conquest, which made him master of nearly all Asia Minor, besides Greece, and brought him into conflict with Rome. For four years Mithridates disputed possession of Asia, but was at last compelled to succumb, B.C. 84. After the death of Sulla, which occurred in B.C. 78, Mithridates levied another army with a determination to expel the Romans from Asia. Being defeated by Lucullus, who was appointed consul B.C. 74, he was followed by the victorious Romans into his own states, and driven to seek a refuge in Armenia, then ruled by Tigranes, who refused to deliver him up. Here Mithridates raised a third great army, and in B.C. 67 completely defeated the Romans, and, following up his success, rapidly recovered the larger part of his dominions. The Romans now invested Pompey with absolute power in the east, and by him, in B.C. 66, the forces of Mithridates were completely routed near the Euphrates. The king retired to Bosphorus (the Crimea), where his troops, headed by his son Pharnaces, broke out in mutiny, and Mithridates killed himself B.C. 63.

MITRAILLEUSE (mit-râ-yeuz), a breech-loading machine-gun introduced in France shortly before the Franco-German war of 1870-71. It consists of a number of rifled barrels, generally thirty-seven, either bound together or bored out of the solid, and mounted on

the same principle as an ordinary field-piece. Plungers and springs are fixed in connection with the breech ends of the barrels that they may be fired in suc-



Mitrailleuse.

cession with great rapidity, so as to concentrate a deadly fire upon any desired point.

MITRE, a sacerdotal ornament worn on the head by bishops and archbishops (including the pope), cardinals, and in some instances by abbots, upon solemn occasions, or by a Jewish high-priest. It is a sort of cap pointed and cleft at the top, this form being supposed to symbolize the "cloven tongues" of the day of Pentecost. The pope has four mitres, which are more or less rich according to the solemnity of the feast-days on which they are to be worn. The English archbishops have a ducal coronet round their mitres.

MITTIMUS, in law, a warrant of commitment to prison; also a writ for removing records from one court to another.

MIZZEN, a term applied to the aftermost mast of a three-masted vessel, that is the one nearest the stern. In a four-master the jigger-mast comes between it and the stern.

MNEMONICS (nē-mon'iks), the art of assisting the memory by methods of association. Many devices have been devised for assisting in the recollection of facts, dates, numbers, or the like, but they all go on the principle of associating the thing to be remembered with something else which can be more easily recollected. The art dates from a very early period, Simonides the Greek poet (500 B.C.) having devised a system. All the systems are more or less arbitrary, and their chief value would seem to lie in the exercise which they give the memory, thereby strengthening it. Memorial lines and verses have been extensively used as aids to memory.

MOA, an extinct bird of New Zealand. See *Dinornis*.

MOAB, the land of the Moabites, a tribe dwelling in the mountainous region east of the Dead Sea. According to the Mosaic account (Gen. xix: 30) the Moabites were descended from Moab, the son of Lot by his eldest daughter. In the time of the judges they were for eighteen years masters of the Hebrews, but in the time of David were rendered tributaries to them. After the Babylonish captivity they lost their separate national existence.

MOABITE STONE, a monument of black basaltic granite about 3 feet 5 inches high and 1 foot 9 inches wide and thick, with rounded top but square base, on which there is an inscription of thirty-four lines in Hebrew-Phœnician

characters, discovered in 1868 at Dhiban in the ancient Moab. It was unfortunately broken by the natives, but almost the whole of the inscription has been recovered from the broken pieces. The inscription dates about 900 B.C., and is the oldest known in the Hebrew-Phœnician form of writing. It was erected by Mesha, king of Moab, and is a record of his wars with Omri, king of Israel, and his successors.

MOBERLY, a city in Randolph co., Mo., on the Mo., Kan. and Tex. and the Wabash railways; 130 miles e. by n. of Kansas City, 148 miles w. of St. Louis. It contains the division headquarters and machine-shops of the Wabash railway system. Pop. 10,142.

MOBILE (mo-bēl'), a city and port of the United States, in Alabama, on the right bank of the Mobile, at its entrance into Mobile Bay. It has regular streets and several fine public buildings; is well supplied with water, and generally healthy, though at times visited by yellow fever. It has an important export trade, and next to New Orleans is one of the greatest cotton marts of the South. A channel 33 miles long is maintained by dredging to allow the approach of tolerably large vessels to the harbor; but it is proposed to construct a new and deeper harbor on Dauphin Island, which will be connected with Mobile by rail. Pop. 1909 about 65,000.

MOBILE, a river of the United States, in Alabama, formed by the union of the Alabama and the Tombigbee, which unite about 45 miles above the town of Mobile. It enters Mobile Bay by two mouths.

MOBILE BAY, an estuary of the Gulf of Mexico, from 8 to 18 miles wide, and



about 35 miles in length, n. to s., the general depth being 12 to 14 feet.

MOBILIER. See *Crédit Mobilier*.

MOBILIZATION, a military term, being the act of putting troops into a state of readiness for active service. The mobilization of an army or a corps includes not only the calling in of the reserve and the men on furlough, but the organizing of the staff, as well as the commissariat, medical, artillery, and transport services, the accumulating of provisions, munitions, and the like.

MOC'CASIN, a shoe or cover for the feet, made of deer-skin or other soft

leather, without a stiff sole, and ornamented on the upper part; the customary shoe worn by the native American Indians.

MOC'CASIN SNAKE, a very venomous serpent frequenting swamps in many of the warmer parts of America. It is about two feet in length, dark-brown above, and gray below.

MOCKING-BIRD, an American bird of the thrush family. It is of an ashy-brown color above, lighter below, and is much sought for on account of its wonderful faculty of imitating the cries or notes of almost every species of animal, as well as many noises that are produced artificially. Its own notes form a beautiful and varied strain. It inhabits North America chiefly, being a constant resident of the southern states, and but rare and migratory in the northern parts of the continent. It is also found in the West Indian Islands and in Brazil.

MOD'ENA, a town of North Italy, capital of the province of its own name. Pop. 64,941.—Modena was formerly an independent duchy bordering on Tuscany, Lucca, Bologna, Mantua, and Parma; area, 2340 sq. miles; pop. over



Mocking-bird.

600,000. It is now divided into the provinces of Modena (966 sq. miles; pop. 315,804), Massa-Carrara, and Reggio.

MODERATOR, the person who presides at a meeting or disputation; now used chiefly as the title of the chairman for president of meetings or courts in the Presbyterian churches.

MODJESKA, Helena, actress, was born at Cracow, Poland, about 1843. In 1865 she became the theatrical star and favorite of Warsaw, a position which she held until about 1876, when she and her husband emigrated to America. She made her appearance in 1877 in an English version of Adrienne Lecouvreur at San Francisco. She won immediate success and has since achieved various triumphs on both sides of the Atlantic. Her notable impersonations were Ophelia, Rosalind, Imogen, Cleopatra, Lady Macbeth. In 1889-90 she starred with Edwin Booth in *Romeo and Juliet*.

MODOCS, an American Indian tribe originally settled on the s. shore of Klamath lake, California. From 1847 till 1873 they were in continual conflict with the whites. Only a small remnant of them now exists in the Indian territory and in Oregon.

MODULATION, in music, the transition from one key to another. The simplest form is the change from a given key to one nearly related to it, namely its fifth (dominant), fourth (subdomi-

nant), its relative minor, or the relative minor of its fifth. Modulation is generally resorted to in compositions of some length, for the purpose of catching and pleasing the ear with a fresh succession of chords.

MOGUL', a word which is the same as Mongol, but is applied particularly to the sovereigns of Mongolian origin, called Great or Grand Moguls, descendants of Tamerlane, who ruled in India from the 16th century downward, the first of them being the conqueror Baber. See India, History of.

MOHAIR, the hair of the Angora goat of Asia Minor. It is soft and fine as silk, of a silvery whiteness, and is manufactured into camlets, plush, shawls, braidings, and other trimmings, etc.

MOHAMMED, Mahom'et, or more correctly Muhammad, the founder of Islamism, was an Arabian by birth, of the tribe of the Koreish, and was born of poor parents in 571 A.D., in Mecca. In his twenty-fifth year his uncle recommended him as agent to a rich widow, named Chadidja, and he acquitted himself so much to her satisfaction that she married him, and thus placed him in easy circumstances. He seems to have had from his youth a propensity to religious contemplation, for he was every year accustomed, in the month Ramadhan, to retire to a cave in Mount Hara, near Mecca, and dwell there in solitude. Mohammed began his mission in the fortieth year of his age by announcing his apostleship to his own family. His wife was one of the first to believe in him, and among other members of his family who acknowledged his mission was his cousin Ali, the son of Abu Talib. Of great importance was the accession of Abu Bekr, a man of estimable character, who stood in high respect, and persuaded ten of the most considerable citizens of Mecca to join the believers in the new apostle. They were all instructed by Mohammed in the doctrines of Islam, as the new religion was styled, which were promulgated as the gradual revelations of the divine will, through the angel Gabriel, and were collected in the Koran. After three years Mohammed made a more public announcement of his doctrine, but his followers were few for years. In 621 Mohammed lost his wife, and the death of Abu Talib took place about the same time. Deprived of their assistance he was compelled to retire, for a time, to the city of Taif. On the other hand, he was readily received by the pilgrims who visited the Kaaba, and gained numerous adherents among the families in the neighborhood. Mohammed now adopted the resolution of encountering his enemies with force. Only the more exasperated at this they formed a conspiracy to murder him; warned of the imminent danger, he left Mecca, accompanied by Abu Bekr alone, and concealed himself in a cave not far distant. Here he spent three days undiscovered, after which he arrived safely at Medina, but not without danger (A.D. 622). This event, from which the Mohammedans commence their era, is known under the name of the Hejra, which signifies flight. In Medina Mohammed met with the

most honorable reception: thither he was followed by many of his adherents. He now assumed the sacerdotal and regal dignity, married Ayesha, daughter of Abu Bekr, and as the number of the faithful continued to increase, declared his resolution to propagate his doctrines with the sword. In the battle of Bedr (623), the first of the long series of battles by which Islamism was established over a large portion of the earth, he defeated Abu Sofian, the chief of the Koreishites. He in turn was defeated by them at Ohod, near Medina, soon after, and in 625 they unsuccessfully besieged Medina, and a truce of ten years was agreed on. Wars with the Jewish tribes followed, many Arabian tribes submitted themselves, and in 630 he took possession of Mecca as prince and prophet. The idols of the Kaaba were demolished, but the sacred touch of the prophet made the black stone again the object of the deepest veneration, and the magnet that attracts hosts of pilgrims to the holy city of Mecca. The whole of Arabia was soon after conquered, and a summons to embrace the new revelation of the divine law was sent to the Emperor Heraclius at Constantinople, the King of Persia, and the King of Abyssinia. Preparations for the conquest of Syria and for war with the Roman Empire were begun, when Mohammed died at Medina (632). His body was buried in the house of Ayesha, where he died, and which afterward became part of the adjoining mosque, and a place of pilgrimage for the faithful in all time to come. Of all his wives, the first alone bore him children, of whom only his daughter Fatima, wife of Ali, survived him. There is no doubt that Mohammed was a man of extraordinary insight and deep reflection. Though without book-learning, he had a deep knowledge of man, was familiar with Bible narratives and eastern legends, and possessed a grasp of the eternal ground of all religion, though tinged and modified by his vivid poetic imagination. See Koran, Mohammedanism.

MOHAMMED, the name of four Ottoman sultans. See Ottoman Empire.

MOHAMMED AHMED. See Mahdi.

MOHAMMED ALI. See Mehemet Ali.

MOHAMMEDANISM, the name commonly given in Christian countries to the creed established by Mohammed. His followers call their creed Islam (entire submission to the decrees of God), and their common formula of faith is, "There is no god but Allah, and Mohammed is his prophet." The dogmatic or theoretical part of Mohammedanism embraces the following points: 1. Belief in God, who is without beginning or end, the sole Creator and Lord of the universe, having absolute power, knowledge, glory, and perfection. 2. Belief in his angels, who are impeccable beings, created of light. 3. Belief in good and evil Jinn (genii), who are created of smokeless fire, and are subject to death. 4. Belief in the Holy Scriptures, which are his uncreated word revealed to the prophets. Of these there now exist, but in a greatly corrupted form, the Pentateuch, the Psalms, and the Gospels; and in an uncorrupted and incorruptible

state the Koran, which abrogates and surpasses all preceding revelations. (See Koran.) 5. Belief in Gods prophets and apostles, the most distinguished of whom are Adam, Noah, Abraham, Moses, Jesus, and Mohammed. Mohammed is the greatest of them all, the last of the prophets and the most excellent of the creatures of God. 6. Belief in a general resurrection and final judgment, and in future rewards and punishments, chiefly of a physical nature. 7. The belief, even to the extent of fatalism, of God's absolute fore-knowledge and predestination of all events both good and evil.

The practical part of Mohammedanism inculcates certain observances or duties, of which four are most important. The first is prayer, including preparatory purifications. Prayer must be engaged in at five stated periods each day. On each of these occasions the Moslem has to offer up certain prayers held to be ordained by God, and others ordained by his prophet. During prayer it is necessary that the face of the worshipper be turned toward the kebla, that is, in the direction of Mecca. Prayers may be said in any clean place, but on Friday they must be said in the mosque. Second in importance to prayer stands the duty of giving alms. Next comes the duty of fasting. The Moslem must abstain from eating and drinking, and from every indulgence of the senses, every day during the month of Ramadhan, from the first appearance of day-break until sunset, unless physically incapacitated. The fourth paramount religious duty of the Moslem is the performance at least once in his life, if possible, of the pilgrimage (el-Hadj) to Mecca, after which he becomes a Hadji. Circumcision is general among Mohammedans, but is not absolutely obligatory. The distinctions of clean and unclean meats are nearly the same as in the Mosaic code. Wine and all intoxicating liquors are strictly forbidden. Music, games of chance, and usury are condemned. Images and pictures of living creatures are contrary to law. Charity, probity in all transactions, veracity (except in a few cases), and modesty, are indispensable virtues. After Mohammed's death Abu Bekr, his father-in-law, became his successor, but disputes immediately arose, a party holding that Ali, the son-in-law of Mohammed, was by right entitled to be his immediate successor. This led to the division of the Mohammedans into the two sects known as Shiites and Sunnites. The former, the believers in the right of Ali to be considered the first successor, constitute at present the majority of the Musselmans of Persia and India; the latter, considered as the orthodox Mohammedans, are dominant in the Ottoman Empire, Arabia, Turkestan, and Africa. The total Mohammedan population of the world is estimated at fully 215,000,000. See Caliph, Shiites, Sunnites, etc.

MOHAWK, a river of the United States, the principal tributary of the Hudson in the state of New York; length about 135 miles. It affords abundant

water-power, and flows through beautiful scenery.

MO'HAWKS, a tribe of North American Indians, belonging to the confederacy of the Five (afterward six) nations. (See Iroquois.) They originally inhabited the valley of the Mohawk river. With the rest of the confederacy they adhered to the British interest during the war of the revolution, and left the country on its termination for Canada, where lands were assigned them on the Grand river. Their language has been committed to writing.

MOHIC'ANS, or **MOHE'GANS**, a tribe of Indians formerly occupying the country now forming the southwestern parts of New England and that portion of New York state east of the Hudson.

MO'HILEV, a town of Russia, capital of a government of the same name. Pop. 43,106.—The government has an area of about 18,545 sq. miles. Pop. 1,708,041.

MOIRE (mwá-râ), the French name given to silks figured by the process called watering. The silks for this purpose, though made in the same way as ordinary silks, are of double width, and must be of a stout substantial make. They are folded and subjected to an enormous pressure, of from 60 to 100 tons, generally in a hydraulic machine, and the air in trying to escape drives before it the small quantity of moisture that is used, and hence is effected the permanent marking called watering, which is for the most part in curious waved lines.

MOLASSES, the uncrystallized syrup produced in the manufacture of sugar. It differs from treacle, as molasses comes from sugar in the process of making, treacle in the process of refining.

MOLE, a name given to insectivorous animals of the genus *Talpa*, family Talpidae, which, in search of worms or insect larvæ, form burrows just under the surface of the ground, throwing up the excavated soil into a little ridge or into little hills. The common mole is found all over Europe, except in the extreme south and north. It is from 5 to 6 inches long; its head is large, without any external ears; and its eyes are very minute, and concealed by its fur, which is short and soft. Its fore-legs are very short and strong, and its snout slender, strong, and tendinous. It is



the only British representative of the family. Another species, blind mole, is found in the south of Europe. It has its name from its eye being always covered by its eyelid. The Cape mole or changeable mole is remarkable as being the only mammal that exhibits the splendid metallic reflection which is thrown from the feathers of many birds. The "star-nosed moles" of North America are so

named from the star or fringe-like arrangement of the nasal cartilages. The shrew moles of North America are more properly included among the shrews.

MOLE, a mound or massive work formed of large stones laid in the sea so as to partially inclose and shelter a harbor or anchorage.

MOLECULE, the smallest quantity of any elementary substance or compound which is capable of existing in a separate form. It differs from atom, which is not perceived, but conceived, inasmuch as it is always a portion of some aggregate of atoms. Molecular attraction is that species of attraction which operates upon the molecules or particles of a body. Cohesion and chemical affinity are substances of molecular attraction. See Chemistry.

MOLE-RAT, a name given to dumpish stout-bodied rodents, with short, strong limbs, a short tail or scarcely any, and minute or rudimentary eyes and ears. They make tunnels and throw up hillocks like the mole, but their food appears to consist wholly of vegetable substances.

MOLESKIN, a strong twilled cotton fabric (fustian), cropped or shorn before dyeing; much used for workmen's clothing. So called from its being soft like the skin of a mole.

MOLIERE (mol-yâr), the assumed name of Jean Baptiste Poquelin, French comic dramatist, born at Paris in 1622. He studied law, but gave it up for the career of an actor, assuming in this profession the name of Moliere. After obtaining great success in the provinces he settled in Paris in 1658, having previously produced his two comedies, *L'Etourdi* and *Le Dépit Amoureux*. In the following year his reputation was greatly advanced by the production of the *Précieuses Ridicules*, a delicate satire on the prevailing affectation of the character of bel esprit, on the pedantry of learned females, and on affectation in language, thoughts, and dress. It produced a general reform when it was brought forward in Paris. Continuing to produce new plays, and performing the chief comic parts himself, he became a great favorite both with the court and the people, though his enemies, rival actors and authors, were numerous. Louis XIV. was so well pleased with the performances of Moliere's company that he made it specially the royal company, and gave its director a pension. In 1662 Moliere made an ill-assorted marriage with Armande Béjart, upward of twenty years younger than himself, a union that embittered the latter part of his life. Among his works other than those mentioned may be noted: *L'Ecole des Maris*, *L'Ecole des Femmes*, *Le Mariage Forcé*, *Don Juan*, *Le Misanthrope*, *Le Médecin Malgré lui*, *Le Tartufe*, *L'Avare*, *George Dandin*, *Les Fourberies de Scapin*, *Le Bourgeois Gentilhomme*, *Le Malade Imaginaire*, etc. Moliere died in 1673 of an apoplectic stroke, a few hours after playing in the latter. As a player he was unsurpassed in high comic parts; and in the literature of comedy he bears the greatest name among the moderns after Shakespeare. He borrowed freely

from Latin, Spanish, and Italian writers, but whatever materials he appropriated he so treated them as to make the result entirely his own and original. The Archbishop of Paris at first refused him burial as being an actor and a reviler of the clergy; but the king himself insisted on it.

MOLINE, a city in Rock Island co., Ill., on the Mississippi river, and the Chi., Bur. and Quincy, Chi., Mil. and St. P., and the Chi., Rock Is. and Pac. railways; opposite Rock Island, 2 miles e. of Davenport, Ia., 168 w. of Chicago. The three cities of Moline, Rock Island, and Davenport, are connected by steam and street railways, ferries, and bridges, and all derive water-power for manufacturing from the river. The city is in a rich coal-region, and there are a number of productive mines in its vicinity. Pop. 20,868.

MOLLUS'CA, an animal sub-kingdom, comprising those soft-bodied animals known as slugs, snails, limpets, oysters, cockles, etc. In some the body is naked and unprotected, in others it is inclosed in a muscular sac, but the great majority are provided with an exoskeleton or shell. The shell-bearing molluscs are popularly divided into univalves, bivalves, and multivalves. The univalves are those whose shell consists of only a single piece, often open and cup-shaped, as in the limpet, or more commonly of a long cone wound spirally round a real or imaginary axis, as the garden-snail, the whelk or periwinkle. The bivalves are those of which the shell is formed of two pieces joined by a hinge, as the cockle and oyster. The multivalve



Mollusca and molluscoida.

1, Cuttle-fish and cuttle-bone. 2, A gastropod. 3, A pteropod. 4, *Terebratula diphyia*. 5, *Cytherea maculata*. 6, *Cynthia papillosa*.

have the shell composed of several pieces. These latter molluscs are few in number. The shells of the Mollusca are secreted by the soft integument or mantle (also called the pallium). The chief mass of the shell is made up of carbonate of lime with a small proportion of animal matter. The mollusca have a distinct alimentary canal, shut off from the general cavity of the body, and situated between the blood system, which lies along the back, and the nerve system, which is toward the ventral aspect of the body. The digestive system consists of a mouth, gullet, stomach, intestine, and anus, except in a few forms, in which the intestine ends blindly. The blood is almost colorless. Respiration is variously effected; in the lamp-shells, by long ciliated arms springing from the sides of the mouth; in the bivalve shell-fish, the cuttle-fishes, and most of the univalves, by gills; while in

the remainder of the univalves, as snails, slugs, etc., the breathing-organs have the form of an air-chamber or pulmonary sac, adapted for breathing air directly. A characteristic of the typical Mollusca is the "foot" or organ of locomotion, which may be modified so as to perform various offices. Its use in the case of the snail is well known, and in the cockle it is developed to a great size. In some cases (as the razor-shells) it enables the animal to burrow rapidly in the sand; while in the mussels, etc., the organ is devoted to the secretion of the well-known beard or byssus, a collection of strong fibrous threads by means of which these animals moor or fix themselves to rocks, etc. In some bivalves (as the oyster) in which the locomotive powers are in abeyance, the foot is rudimentary. In the cuttle-fishes it is represented by the arms or tentacles round the mouth. The chief peculiarity, however, of the Mollusca is in the nervous system, which in the lower forms consists essentially of a single ganglionic mass, giving off filaments in various directions; while in the higher there are three such masses, united to one another by nervous cords.

MOLLY MAGUIRES, the name assumed by members of a secret illegal association in Ireland, afterward reorganized in the anthracite coal-mining district of Pennsylvania. The organization was guilty of many outrages, and was broken up in 1876, twenty members being hanged for murder.

MOLOCH, the chief god of the Phœnicians, frequently mentioned in Scripture as the god of the Ammonites, whose worship consisted chiefly of human sacrifices, ordeals by fire, mutilation, etc.

MOLOCH LIZARD, a genus of lizards found in Australia. *M. horridus* (moloeh-lizard) is one of the most ferocious-looking, though at the same time one of the most harmless of reptiles, the horns on the head and the numerous spines on the body giving it a most formidable and exceedingly repulsive appearance.

MOLTKE (molt'kè), Helmuth Carl Bernhard, Count von, German field-



Field-marshal Von Moltke.

marshal, born near Mecklenburg, 1800; entered the Danish army in 1819; left that service for the Prussian in 1822, and became a staff-officer in 1832. In 1835 he superintended the Turkish military reforms, and he was present

during the Syrian campaign against Mehemet Ali in 1839. He returned to Prussia and became colonel of the staff in 1851, and equerry to the crown prince in 1855. In 1858 as provisional director of the general staff he acted in unison with Von Roon and Bismarck in the vast plans of military reorganization soon after carried out. The conduct of the Danish war (1864) was attributable to his strategy, as was also the success of the Austro-Prussian war of 1866, and the Franco-Prussian war of 1870-71. In the latter year he was made field-marshal and became count in 1872. He retired from the position of chief of the general staff in 1888. His death took place in 1891.

MOLUC'CAS, or **SPICE ISLANDS**, a name originally confined to the five small islands of Ternate, Tidore, Motir, Makian, and Batshian, but now applied to the widely scattered group lying between Celebes and Papua, between lat. 3° s. and 6° n., and lon. 126° to 135° e. The area is about 45,000 sq. miles, and the population 500,000. The islands (some hundreds in number) are nearly all mountainous, mostly volcanic and earthquakes are by no means uncommon. They abound in gaily-colored birds and gorgeous insects; and are covered by a luxuriant tropical flora. Cloves, nutmegs, mace, and sago are exported to Europe; and birds'-nests, trepang, etc., to China.

MONACHISM. See Monastery and Orders (Religious).

MON'ACO, a principality lying between the French department Alpes Maritimes (Nice) and the Mediterranean. In 1861 the Prince of Monaco sold the departments of Mentone and Roceabruna to France for 4,000,000 francs; and the principality has since then been confined to an area of about 8 square miles, with a population of 15,180. The prince (a scion of the house of Grimaldi) exercises both legislative and executive functions, while the people are exempt from taxation, as the revenue is almost entirely derived from the rents of the gaming establishment. The capital, Monaco (pop. 3292), situated on a rocky height projecting into the sea, is a renowned watering-place. About a mile to the e. is Monte Carlo, a collection of hotels and villas which have sprung up near the luxurious gardens of the handsome gambling casino, established here in 1860. This institution is now the property of a joint-stock company. The inhabitants of Monaco are not admitted to the gaming-tables.

MONAD, in philosophy, an imaginary entity in the philosophy of Leibnitz, according to whom monads are simple substances, of which the whole universe is composed, each differing from every other, but all agreeing in having no extension, but in being possessed of life, the source of all motion and activity. Every monad, according to Leibnitz, is a soul, and a human soul is only a monad of elevated rank.

MON'AGHAN, a county of Ireland in Ulster; area 319,741 acres. Pop. 74,505.

MONARCHY is a state or government in which the supreme power is either actually or nominally vested for life in a

single person, by whatsoever name he may be distinguished. A monarchy in which the subjects have no right or powers as against the monarch (e.g. Persia) is termed despotic or absolute; when the legislative power is wholly in the hands of a monarch, who, however, is himself subject to the law (e.g. Russia), it is termed autocratic; but when the monarch shares the power of enacting laws with representatives of the people, the monarchy is limited or constitutional (e.g. Great Britain). In ancient Greece, a monarchy in which the ruler either obtained or administered his power in violation of the constitution was termed a tyranny, however beneficent and mild the rule might be. Monarchies are either hereditary, as in Great Britain, or elective, as was formerly the case in Poland.

MONASTERY, a house into which persons retire from the world to lead a life devoted to religion. The practice of monachism or monastic seclusion, though it has been carried to its greatest development within the Christian Church had its origin in periods long anterior to the Christian era, and has long flourished in countries where Christianity has little or no influence, as among the Brahmans and Buddhists. Christianity was probably not without its ascetics even from the first, but it was not until the close of the 3d century, when the Neo-Platonic and Gnostic doctrines of the antagonism between body and soul had gained strength, that solitary life began to be specially esteemed. The foundation of the first Christian monasteries is ascribed to Anthony the Great, who about 305, in the deserts of Upper Egypt, collected a number of hermits, who performed their devotional exercises in common. His disciple Pachomius in the middle of the 4th century, built a number of houses not far from each other, upon the island of Tabenna, in the Nile, each of which was occupied by three monks (syneelli) in cells, who were all under the superintendence of a prior. These priors formed together the cænobium, or monastery, which was under the care of the abbot, hegumenos or mandrite, and were obliged to submit to uniform rules of life. Western monasticism, which rapidly spread during the 5th century, was accompanied by many irregularities, until monastic vows were introduced in the 6th century by St. Benedict. The monasteries of the west now became the dwellings of piety, industry, and temperance, and the refuge of learning. Missionaries were sent out from them; deserts and solitudes were made habitable by industrious monks; and in promoting the progress of agriculture and converting the German and Slavonic nations, they certainly rendered great services to the world from the 6th century to the 9th. Another incalculable benefit conferred upon civilization by the monasteries is the preservation of nearly the whole of the classic and mediæval MS. literature that we possess.

But monasteries changed their character, to a great degree, as their wealth and influence increased. Idleness and luxury crept within their walls, together

with all the vices of the world, and their decay became inevitable, when, by a custom first introduced by the Frankish kings, and afterward imitated by other princes, they came under the care of lay abbots or superiors, who, thinking only of their revenues, did nothing to maintain discipline among the monks and nuns. These being left wholly to their own government by the bishops, originally their overseers, soon lost their monastic zeal. A few only, by means of the convent schools (founded by Charlemagne for the education of the clergy), as, for instance, those at Tours, Lyons, Rheims, Cologne, Trèves, Fulda, etc., maintained their character for usefulness till the 9th and 10th centuries. The monastery at Cluny, in Burgundy, first led the way to reform. This was founded in the year 910, under Berno, was governed by the rules of St. Benedict, with additional regulations of a still more rigid character, and attained the position, next to Rome, of the most important religious center in the world. Many monasteries in France, Spain, Italy, and Germany were reformed on this model, and the Benedictine rule now first became prominent in Britain through the instrumentality of Dunstan. The Celtic and other monasteries of Britain and Ireland heretofore seem to have had an independent historical connection with the early monachism of Egypt. The three great military orders (Templars, Hospitallers, and Teutonic Knights) were founded in the 12th century; while the famous mendicant orders of the Franciscans and Dominicans date from the 13th. With the reputation of renewed sanctity the monasteries acquired new influence and new possessions. Many of them ("exempt monasteries") released themselves from all superintending authority except that of the pope, and acquired great wealth in the time of the Crusades from the estates of Crusaders and others placed under the protection of their privilege of inviolability, or even left to them in reversion. But with this growing influence the zeal for reformation abated; new abuses sprang up, and the character of each monastery came, at last to depend chiefly upon that of its abbot.

The number of monasteries was much diminished at the time of the reformation, when the rich estates of those in Protestant states were in part appropriated by the sovereign to his own use, in part distributed to nobles and ecclesiastics, and in part devoted to educational and benevolent purposes. In Catholic countries this period was marked by a revival of the spirit of monastic reform; while many new orders were founded whose objects were more directly practical (teaching, tending the sick, visiting the poor) than those of the older and more contemplative orders. Monachism, however, as belonging to the older system of things, was regarded with hostility by the spirit of rationalism and liberalism which found decisive expression in the French revolution; and during the 18th century the monastic orders were obliged, as the papal power diminished, to submit to many restrictions imposed upon them by Catholic

princes, or to purchase immunity at a high price. In 1781 the houses of some orders were wholly abolished by the Emperor Joseph II., and those suffered to remain were limited to a certain number of inmates, and cut off from all connection with any foreign authority. In France the abolition of all orders and monasteries was decreed in 1789, and the example was followed by all the states incorporated with France under the protection of Napoleon I. In the 19th century, however, under Napoleon III. and during the early years of the republic, monachism prospered in France, though since 1880 only monasteries authorized by the state are permitted to exist. In Germany all orders except those engaged in tending the sick were abolished in 1875. The unification of Italy was followed by a series of decrees pronouncing all monastic orders illegal. In Portugal monasteries were abolished by decree in 1834, and in Spain in 1837. In Russia the number of such institutions is strictly limited by law. In the Roman Catholic states of South America the same policy of abolition has been adopted; whereas in the United States and Canada several orders have made considerable progress.

MONASTIC VOWS, are three in number: poverty, chastity, and obedience. The vow of poverty prevents the monks from holding any property individually. Monasteries, however, professing merely the "high" degree of poverty may possess real estate, yet not more than enough for their support, as the Carmellites and Augustines. In the "higher" degree a monastery may hold only personal property, as books, dresses, supplies of food and drink, rents, etc., as the Dominicans. The "highest" degree absolutely forbids both real and personal property, as is the case with the Franciscans, and especially the Capuchins. The vow of chastity requires an entire abstinence from familiar intercourse with the other sex; and that of obedience, entire compliance with the rules of the order and the commands of the superior.

MONDAY (that is, moon-day; Anglo-Saxon, Monandæg; German, Montag), the second day of our week, formerly sacred to the moon.

MONEY, in its ordinary sense, is equivalent to pieces of metal, especially gold and silver, duly stamped and issued by the government of a country to serve as a legalized standard of value. In this sense it is more precisely designated metallic money to distinguish it from paper money, from which latter it is also distinguished by having an intrinsic value. A few particulars regarding money may here be given as supplementary to information contained in the articles Currency, Coining, Bank, etc. The sovereign and half-sovereign are the legal metal standard of value in the United Kingdom and most of the colonies. By the Latin Monetary Convention, which includes France, Belgium, Italy, Switzerland, and Greece, it has been agreed that the gold napoleon and the silver five-franc piece—or corresponding pieces—are to be exchangeable throughout these countries as their standard money; while by the Scandinavian

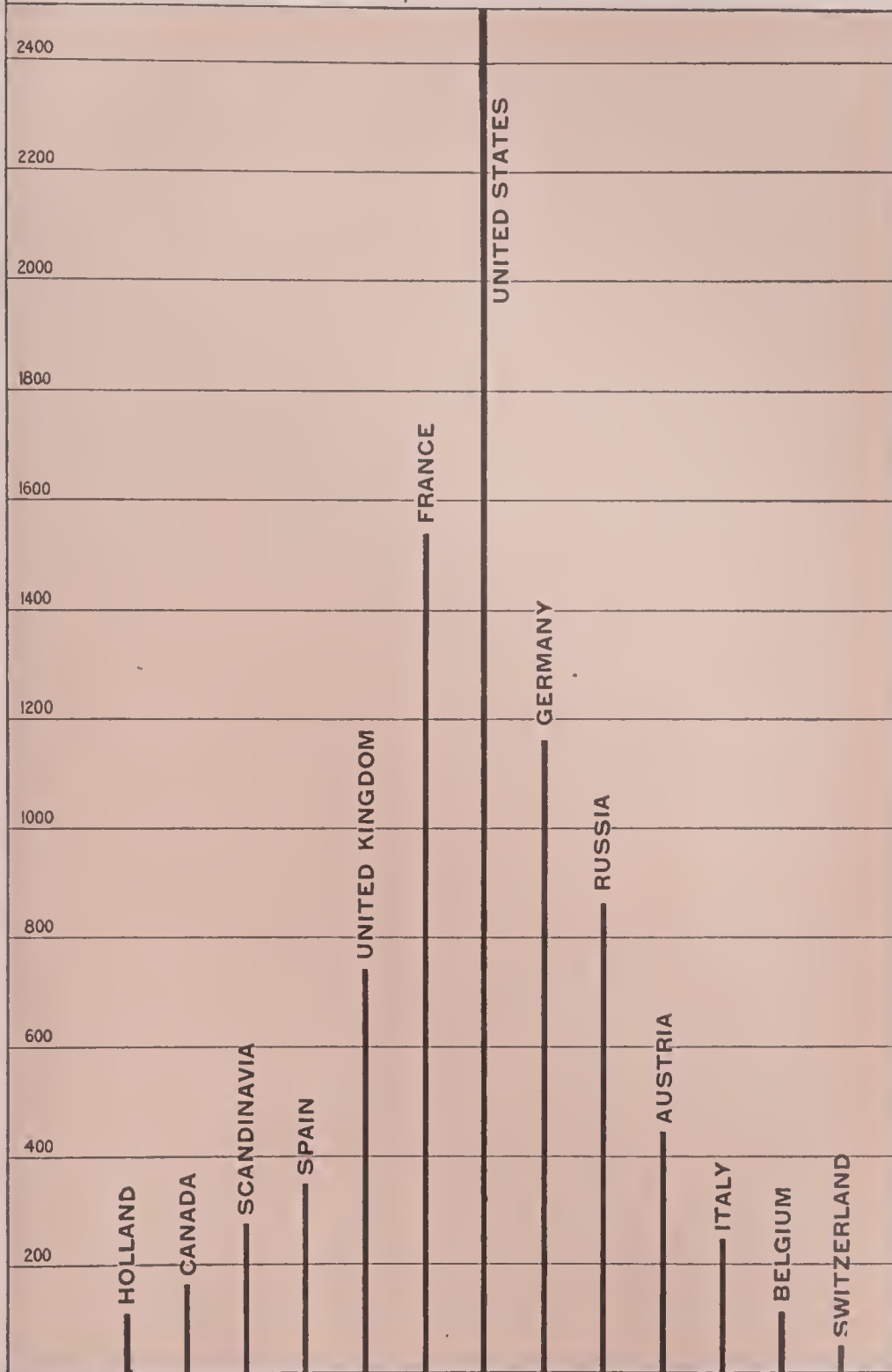
Monetary Convention, which includes Norway, Sweden, and Denmark, the gold 20-kroner and 10-kroner pieces are the standard coins. These contracting states have thus agreed to issue no gold or silver coins except of a certain weight, fineness, and diameter. In Germany the 5-mark, 10-mark, and 20-mark pieces, and in the United States the gold dollar, are the standard units; while in Austria the silver florin, and in Russia the silver rouble, are the recognized standard coins. Moneys of account are those denominations of money in which accounts are kept, and which may or may not have a coin of corresponding value in circulation. In England the pound sterling may be said to be purely a money of account, although there is a coin, the sovereign of corresponding value. The money unit in various countries is as follows: England, the pound sterling; Belgium, France, and Switzerland, the franc; Germany, the mark; Austria-Hungary, the crown; Russia, the rouble; Italy, the lira; Spain, the peseta; Sweden, Norway, and Denmark, the krona; Holland, the guilder; Portugal, the milreis; Greece, the drachma; Turkey, the piaster; United States, the dollar; Brazil, the milreis; India, the rupee; China, the liang or tael; Japan, the yen.

MONGHYR (mon-gēr'), a district and town of India, in Bengal. The district has an area of 3921 sq. miles. Pop. 35,880; of the district, 2,064,077.

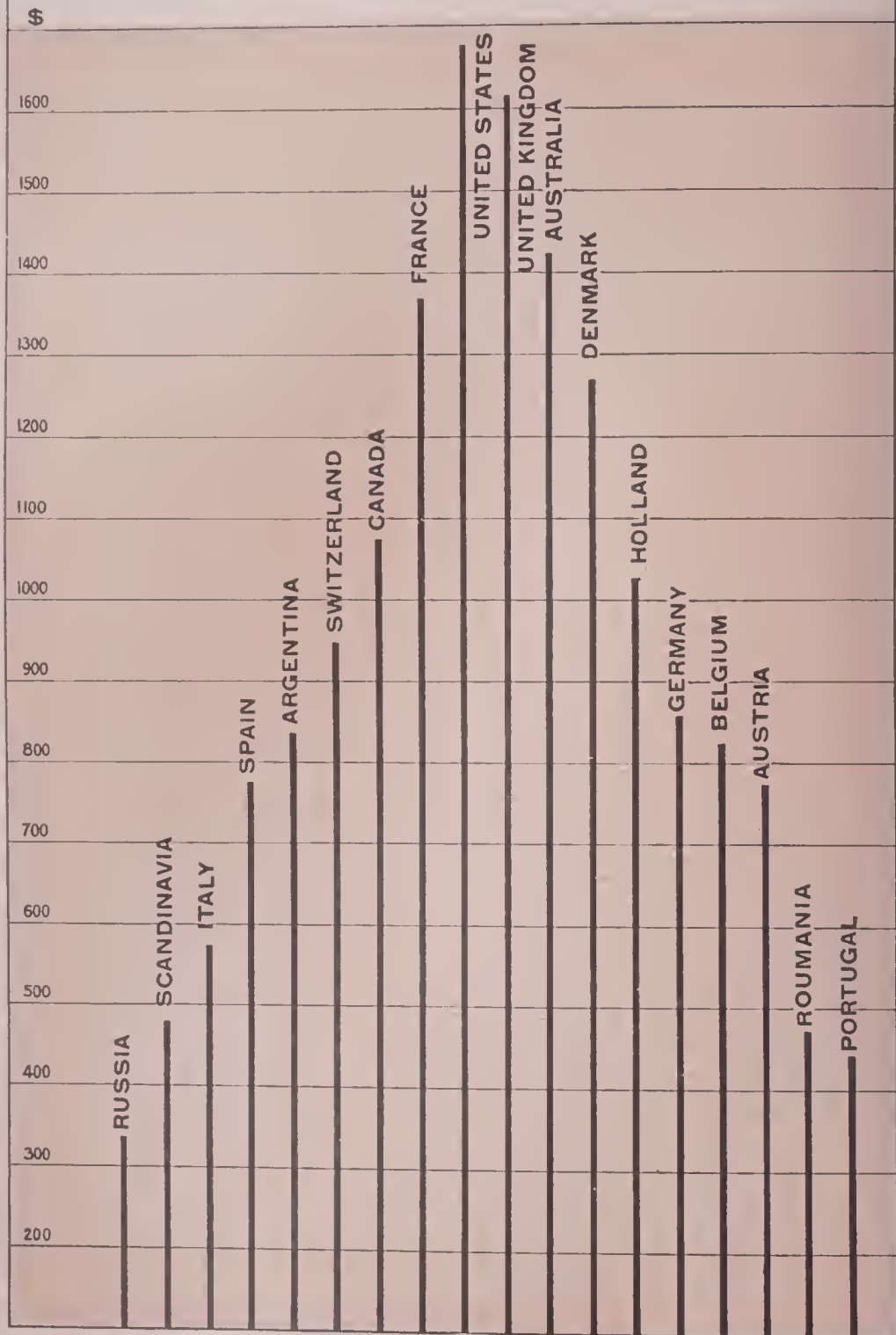
MONGO'LIA, a vast region of the northeast of Asia, belonging to the Chinese Empire, is situated between China Proper and Asiatic Russia; estimated area, 1,400,000 sq. miles. Pop. estimated at 2,000,000.

MONGOLS, a race of people in the northeast of Asia, whose original seat seems to have been in the north of the present Mongolia, and in Siberia to the southeast of Lake Baikal. Their first great advance was due to Genghis Khan, who having been, originally, merely the chief of a single Mongol horde, compelled the other hordes to submit to his power, and then, in 1206, conceived the bold plan of conquering the whole earth. (See Genghis Khan.) After the death of Genghis Khan, in 1227, his sons and grandsons pursued his conquests, subjugated all China, subverted the caliphate of Bagdad (1263), and made the Seljuk sultans of Iconium tributary. In 1237 a Mongol army invaded Russia, devastated the country with the most horrible cruelty, and from Russia passed, in two divisions, into Poland and Hungary. At Pesth the Hungarian army was routed with terrible slaughter, and at Liegnitz, in Silesia, Henry, duke of Breslau, was defeated in a bloody battle, April 9, 1241. The Mongols were recalled, however, from their victorious career by the news of the death of Ogdoi, in December, 1241, the immediate successor of Genghis Khan. The empire of the Mongols was at the summit of its power during the reigns of Mangu Khan (1251-59) and Khubilai or Kublai Khan (1259-94), the patron of Marco Polo. At that time it extended from the Chinese Sea and from India far into the interior of Siberia, and to the frontiers of Poland. The principal seat of the khakan or great

MONEY OF THE NATIONS IN MILLIONS OF DOLLARS



WEALTH OF THE WORLD PER INHABITANT



MONEY—VALUE OF FOREIGN COINS IN UNITED STATES

(Proclaimed by the Secretary of the Treasury October 1, 1906*)

Country	Stand- ard	Monetary Unit	Value in U.S. Gold Dollar	Coins
Argent. R...	Gold...	Peso	\$0.96,5	Gold: argentine (\$4.82,4) and ½ argentine. Silver: peso and divisions.
Austria-H...	Gold...	Crown .....	.20,3	Gold: 10 and 20 crowns. Silver: 1 and 5 crowns.
Belgium....	Gold...	Franc.....	.19,3	Gold: 10 and 20 francs. Silver: 5 francs.
Bolivia....	Silver...	Boliviano.....	.48,5	Silver: boliviano and divisions.
Brazil.....	Gold...	Milreis.....	.54,6	Gold: 5, 10, and 20 milreis. Silver: ½, 1, and 2 milreis.
Canada.....	Gold...	Dollar	1.00	Silver: peso and divisions.
Cent. Am...	Silver...	Peso† .....	.48,5	Gold: escudo (\$1.82,5), doubloon (\$3.65), and condor (\$7.30). Silver: peso and divisions.
Chile.....	Gold...	Peso .....	.36,5	
China.....	Silver...	Tael .. { Shanghai { Haikwan { Canton ..	.72,6 1.80,8 .79,2	
Colombia...	Gold...	Doilar.....	1.00	Gold: condor (\$9.64,7) and double condor. Silver: peso.
Costa Rica..	Gold...	Colon .....	.46,5	Gold: 2, 5, 10, and 20 colons (\$9.30,7). Silver: 5, 10, 25, and 50 centimos.
Denmark....	Gold...	Crown .....	.26,8	Gold: 10 and 20 crowns.
Ecuador....	Gold...	Sucre .....	.48,7	Gold: 10 sucres (\$4.86,65). Silver: Sucre and divisions.
Egypt.....	Gold...	Pound (100 piasters)	4.94,3	Gold: pound (100 piasters), 5, 10, 20, and 50 piasters. Silver: 1, 2, 5, 10, and 20 piasters.
France.....	Gold...	Franc.....	.19,3	Gold: 5, 10, 20, 50, and 100 frs. Silver: 5 frs.
Germany....	Gold...	Mark.....	.23,8	Gold: 5, 10, and 20 marks.
Gt. Britain..	Gold...	Pound sterling...	4.86,6½	Gold: sovereign (pound sterl.) and ½ sov'gn.
Greece.....	Gold...	Drachma.....	.19,3	Gold: 5, 10, 20, 50, and 100 drachmas. Silver: 5 drachmas.
Hayti.....	Gold...	Gourde .....	.96,5	Gold: 1, 2, 5, and 10 gourdes. Silver: gourde and divisions.
India.....	Gold...	Pound sterling\$..	4.86,6½	Gold: sov. (\$4.86,65). Sil.: rupee and div'ns.
Italy.....	Gold...	Lira.....	.19,3	Gold: 5, 10, 20, 50, and 100 lire. Silver: 5 lire.
Japan.....	Gold...	Yen .....	.49,8	Gold: 1, 2, 5, 10, and 20 yen. Silver: 10, 20, and 50 sen.
Mexico.....	Gold...	Peso† .....	.49,8	Gold: 5 and 10 pesos. Silver: dollar (or peso)** and divisions.
Netherlands	Gold...	Florin .....	.40,2	Gold: 10 florins. Silver: ½, 1, and 2½ florins.
N'foundland	Gold...	Dollar	1.01,4	Gold: 2 dollars (\$2.02,7).
Norway.....	Gold...	Crown .....	.26,8	Gold: 10 and 20 crowns.
Panama.....	Gold...	Balboa.....	1.00,0	Gold: 1, 2½, 5, 10, and 20 balboas. Silver: peso and divisions.
Peru.....	Gold...	Libra	4.86,6½	Gold: ½ and 1 libra. Sil.: sol and divisions.
Portugal...	Gold...	Milreis.....	1.08	Gold: 1, 2, 5, and 10 milreis.
Russia.....	Gold...	Ruble .....	.51,5	Gold: 5, 7½, 10, and 15 rubles. Silver: 5, 10, 15, 20, 25, 50, and 100 copeks.
Spain.....	Gold...	Peseta .....	.19,3	Gold: 25 pesetas. Silver: 5 pesetas.
Sweden.....	Gold...	Crown .....	.26,8	Gold: 10 and 20 crowns.
Switzerland	Gold...	Franc.....	.19,3	Gold: 5, 10, 20, 50, and 100 francs. Sil.: 5 fr's.
Turkey.....	Gold...	Plaster.....	.04,4	Gold: 25, 50, 100, 250, and 500 piasters.
Uruguay....	Gold...	Peso	1.03,4	Gold: peso. Silver: peso and divisions.
Venezuela..	Gold...	Bolivar.....	.19,3	Gold: 5, 10, 20, 50, and 100 bolivars. Silver: 5 bolivars.

* The coins of silver-standard countries are valued by their pure silver contents, at the average market price of silver for the three months preceding the date of this circular. † Not including Costa Rica. § The sovereign is the standard coin of India, but the rupee (\$0.44,8) is the money of account, current at 15 to the sovereign. ‡ Customs. ¶ Seventy-five centigrams fine gold. ** Value in Mexico 49.8.

TABLE SHOWING THE VALUE OF FOREIGN COINS AND PAPER NOTES IN AMERICAN MONEY BASED UPON THE VALUES EXPRESSED IN THE ABOVE TABLE

Number	British £ Sterling	German Mark	French Franc, Italian Lira	Chinese Tael (Haik- wan)	Dutch Florin	Japanese Yen, Mexican Peso	Russian Gold Ruble	Austrian Crown
1	\$4.86,6½	\$0.23,8	\$0.19,3	\$0.80,8	\$0.40,2	\$0.49,8	\$0.51,5	\$0.20,3
2	9.73,3	.47,6	.38,6	1.61,6	.80,4	.99,6	1.03	.40,6
3	14.59,9½	.71,4	.57,9	2.42,4	1.20,6	1.49,4	1.54,5	.60,9
4	19.46,6	.95,2	.77,2	3.23,2	1.60,8	1.99,2	2.06	.81,2
5	24.33,2½	1.19	.96,5	4.04,0	2.01	2.49,0	2.57,5	1.01,5
6	29.19,9	1.42,8	1.15,8	4.84,8	2.41,2	2.98,8	3.09	1.21,8
7	34.06,5½	1.66,6	1.35,1	5.65,6	2.81,4	3.48,6	3.60,5	1.42,1
8	38.93,2	1.90,4	1.54,4	6.46,4	3.21,6	3.98,4	4.12	1.62,4
9	43.79,8½	2.14,2	1.73,7	7.27,2	3.61,8	4.48,2	4.63,5	1.82,7
10	48.66,5	2.38	1.93	8.08,0	4.02	4.98,0	5.15	2.03
20	97.33	4.76	3.86	16.16,0	8.04	9.96,0	10.30	4.06
30	145.99,5	7.14	5.79	24.24,0	12.06	14.94,0	15.45	6.09
40	194.66	9.52	7.72	32.32,0	16.08	19.92,0	20.60	8.12
50	243.32,5	11.90	9.65	40.40,0	20.10	24.90,0	25.75	10.15
100	486.65	23.80	19.30	80.80,0	40.20	49.80,0	51.50	20.30

khan was transferred by Khubilia from Karakorum to China; the other countries were governed by subordinate khans, all of whom were descended from Genghis, and several of whom succeeded in making themselves independent. This division of the empire was the cause of the gradual decay of the power and con-

ward to their original home, the eastern Mongols remained for a time subject to the descendants of Genghis Khan, but gradually splitting up into small independent tribes they finally were subdued and absorbed by the Manchu conquerors of China. Of the western Mongols the most powerful were the Kipchaks or Golden Horde, who lived on the Volga, and the khanate founded in Bokhara, on the Oxus, by Jagatai, the eldest son of Genghis Khan. The former gradually fell under the power of the Russians; but among the latter there appeared a second formidable warrior, Timurlenk (Tamerlane), called also Timur Beg. In 1369 he chose the city of Samareand for the seat of his new government. The other Mongol tribes, with Persia, Central Asia, and Hindustan, were successively subjugated by him. In 1402, at Ancyra (Angora), in Asia Minor, he defeated and captured the Sultan Bajazet I., who had been hitherto victorious against the Christians in Europe, and before whom Constantinople trembled. After Timur's death, in 1405, his empire barely held together until 1468, when it was again divided. Baber (Babur), a descendant of Timur, founded in India, in 1519, the empire of the Great Mogul, which existed in name till 1857, though its power ended in 1739. After the commencement of the 16th century the Mongols lost all importance in the history of the world, became split up into a number of separate khanates and tribes, and fell under the power of the neighboring peoples. Their name still lingers in the Chinese province of Mongolia, but Mongolian tribes are found far beyond its boundaries.

The term Mongolians or Mongolidæ is to some extent used by anthropologists to signify a very large division of the races of men, of which the Mongol proper were considered typical. This use of the name, which includes Tartars, Turks, Finns, Chinese, and Japanese, is to be carefully distinguished from the historical use.

MONITOR, the popular name for a class of very shallow, heavily-armed iron-clad steam-vessels, invented by Ericsson, carrying on their open decks either one or two revolving turrets, each containing one or more enormous



Ericsson's monitor of 1861.

guns, and designed to combine the maximum of gun-power with the minimum of exposure. Monitors are so called from the name of the first vessel of the kind, built during the American civil war, which proved its superiority in a famous engagement with the Merrimac in 1862.

MONK, a man who retires from the world to live in a monastery as member of some religious order. Originally all monks were laymen, but after about the 8th century the superiors, and by degrees other members, were admitted to holy orders. See Monastery.

MONK, George, Duke of Albemarle,

an English general, famous for the prominent part he took in the restoration of Charles II., was born in 1608. In the struggle between Charles I. and the parliament Monk at first joined the royalists; but in January, 1644, he was taken prisoner at the siege of Nantwich, and after a short delay he was committed to the Tower. After the capture of the king Monk took the Covenant and regained his liberty, in 1646. Under the parliament he served in Ireland, and subsequently with Cromwell in Scotland and in 1650 he reduced that country to obedience within a few weeks. In 1654



General Monk.

he was the head of the English army in Scotland, and he was still in this position at the death of the protector and at the resignation of his son in 1659. The coming over of Charles II. was arranged with Monk, and the king rewarded his restorer with the dukedom of Albemarle the order of the Garter, and with a pension. He died in 1670, and was buried in Westminster Abbey.

MONKEYS, the popular name applied sometimes to the whole of the great mammalian order Quadrumana, sometimes limited to those of the order that have tails, and generally cheek-pouches, to the exclusion of the apes, baboons, and lemurs. The general characters of the quadrumanous mammals are found in the great toe being opposable to the other digits of the foot, so that the feet become converted into "hands." The



Guenon, or common green monkey.

hallux or thumb may be absent, but when developed it is generally opposable to the other fingers; and the animals thus come to possess "four hands," or are "quadrumanous." The monkeys may all be divided into a lower and a higher section. The higher section is that of the Catarrhina (Greek, kata, downward, and rhines, nostrils) or Old

World monkeys. The catarrhine monkeys are distinguished by their obliquely-set nostrils, the nasal apertures being placed close together, and the nasal septum being narrow. Opposable thumbs and great toes exist in nearly all. The tail may be rudimentary or wanting, but in no case is it prehensile. Cheek-pouches, which are used as receptacles for food preparatory to its mastication, are present in many; and the skin covering the prominences of the buttocks is frequently destitute of hair, becomes hardened, and thus constitutes the so-called natal callosities. The catarrhine monkeys inhabit Asia and Africa. They include the anthropoid or man-like apes; the gibbons, the orang, the chimpanzee and the gorilla, the baboons and mandrills, the sacred monkey of the Hindus, the proboscis monkey, the Diana monkey, the mona, the wanderer, etc. The lower section of monkeys consists of the New World monkeys, which are entirely confined to South America. They have the nostrils widely separated, the septum or partition between being broad, hence the name. Another peculiarity consists in their prehensile tails and there are none of the cheek-pouches or hard callosities on the rump so characteristic of Old World monkeys. The diet is especially of a vegetable nature. This section includes the marmosets, the spider-monkeys, the capuchin monkeys, the squirrel-monkeys, the howling monkeys, etc. See Apes, Baboons, etc.

MONK'S-HOOD. See Aconite.

MONMOUTH, a parliamentary and municipal borough of England, county town of Monmouthshire, is situated in a beautiful valley at the confluence of the Monnow and Wye. Pop. 5470.—The county is bounded by the counties of Hereford, Gloucester, Brecknock, and Glamorgan, and the estuary of the Severn; area, 370,350 acres. Pop. 292,327.

MONMOUTH, James, Duke of, the natural son of Lucy Walters, one of the mistresses of Charles II., was born at Rotterdam in 1649. After the restoration he was created Duke of Orkney and Duke of Monmouth (1663), married the daughter and heiress of the Earl of Buccleuch, and received the Garter. It was reported that the king had been privately married to Lucy Walters, and the popular dislike of the Duke of York, afterward James II., joined with the fact of Monmouth being a Protestant, gave occasion to hopes that her son might succeed to the crown. On the accession of James II. he was induced to attempt an invasion of England. His small body of undisciplined troops were totally defeated at Sedgemoor, and the duke himself was captured and beheaded 15th July, 1685, after abject appeals to the king for mercy.

MON'OCHROME, a painting executed in a single color. This description of art is very ancient, and was known to the Etruscans. The most numerous examples existing of this kind of painting are on terra cotta. A painting, to be a proper monochrome, must have the figures relieved by light and shade.

MON'OGRAM, a character or cipher composed of one, two, or more letters

interwoven, and used as a sign or abbreviation of a name or word. The use of monograms was common among the Greeks and Romans, and the art of combining and contorting letters and words flourished universally in the middle ages. The term is now applied to conjoined initials of a personal name on seals, trinkets, letter-paper and envelopes, etc. or employed by printers, painters, engravers, etc., as a means of distinguishing their work.

MON'OLITH, a pillar, obelisk, or other large object cut from a single block of stone. See accompanying plate and description.

MONOMET'ALLISM, the principle of having only one metallic standard in the coinage of a country; opposed to bimetalism.

MONONGAHE'LA, a river of the United States, formed by the union of West Fork and Tygart's Valley river in West Virginia, runs north into Pennsylvania, and unites with the Alleghany, at Pittsburg, to form the Ohio. It is navigable for large boats 60 miles, and for small boats 200 miles from its mouth. Its length to the source of the Tygart's Valley river is 300 miles.

MONOP'OLY, is an exclusive right, conferred by authority on one or more persons, to carry on some branch of trade or manufacture. The monopolies most frequently granted were the right of trading to certain foreign countries, of importing or exporting certain articles, or of exercising particular arts or trades. The entire trade and industry of the middle ages was characterized by attempts to erect and maintain monopolies, as evidenced by the trade-guilds and such associations as the Hanseatic League. The discovery of the New World only provided a fresh sphere for the same system; for not only did every government endeavor to monopolize the trade of its colonies, but in nearly every case the new countries were opened up by privileged "adventurers" and jealous monopoly companies. The granting of monopolies has at all times been opposed to the spirit of English common law, but the practice was very common previous to the accession of the Stuarts. The abuse reached its height under Elizabeth. Notwithstanding the reluctance of the crown to surrender what was considered one of its most valuable prerogatives, the Statute of Monopolies (21 James I. cap. iii.) was passed in 1623, abolishing all licenses, monopolies, etc., with some exceptions. This act, which lifted an immense incubus from the industrial prosperity of the realm, is (with amendments) still in force; and its excepting clauses are the basis of the present laws as to patents, copyrights, etc. Both in Great Britain and other countries there are certain so-called government monopolies maintained on various grounds of public policy. Examples of such monopolies are the postal and telegraph service, the tobacco monopoly in France, the opium monopoly in India, etc. There are also numerous quasi-monopolies, such as those enjoyed by railway, water, and gas companies, and similar semi-public organizations.

MON'OTHEISM, the belief in, and

worship of, a single, personal God; opposed to polytheism and distinct also from pantheism. It was at one time the received opinion that monotheism was the primeval intuitive form of religion, but most recent authorities now hold that it was everywhere posterior to polytheism, whence it was evolved by a gradual education. Henotheism, which Max Müller and Schelling maintain to be the primeval form, is merely the rudimentary phase of polytheism in minds, not yet conscious of the complexity of the problems for which polytheism is suggested as the solution by more developed intellects. The three great modern monotheistic religions are Judaism, Christianity, and Mohammedanism. The Jewish prophets had a firm persuasion of one God, the Father and Judge of all; but they are continually upbraiding the people for lapsing into polytheism. After the Babylonish captivity the people became fixed in their belief. Christian monotheism is, of course, historically a development of Hebrew monotheism; and Mahomet probably borrowed the doctrine from the same source. Both Jew and Mohammedan regard the Trinitarian conception of Deity as a deviation from the pure doctrine of monotheism.

MONROE (mon-rō'), James, fifth president of the United States of America, was born in 1758 in Westmoreland county, Virginia; died at New York in 1831. He was educated at William and



James Monroe.

Mary college, and from 1776 till 1778 served in the revolutionary army. He then devoted himself to the study of law. In 1782 and in 1787 he was elected a member of the Virginia Assembly, and from 1783 till 1786 he represented Virginia in congress. In 1788 as a member of the Convention of Virginia he strenuously opposed the ratification of the new Federal constitution. In 1790 he was elected to the senate of the United States. In 1794-96 he was minister plenipotentiary to France. From 1799 till 1802 he was governor of Virginia, and in 1803 he returned as envoy-extraordinary to France on a mission which resulted in the acquisition of Louisiana for 15,000,000 dollars. He was afterward employed in diplomacy in England and Spain. In 1811 he was governor of Virginia, in 1811-17 he was secretary of state, being secretary of war in 1814-15. In 1816 the democratic republican party elected him to the presidency of the United States. In 1820 he was re-elected, only one vote being cast against him. This he owed chiefly

to his having procured the cession of Florida by Spain, and to the settlement of the vexed question of the extension of slavery by the Missouri compromise (which see). Mexico and the emancipated states of South America were formally recognized by the American government during Monroe's second term; but the leading event in it was the promulgation of the "Monroe doctrine."

MONROE DOCTRINE, The, a principle in international politics, corresponding in America to the balance of power in Europe, was formulated in President Monroe's message of December 2, 1823, in the statement that the United States would consider any attempt to extend the European political system to any portion of America, as dangerous to their peace and safety. At the same time the American continents were declared to be no longer subjects for colonization by any European power. The doctrine has several times been asserted, notably in the attitude of the United States toward Napoleon III. during his Mexican undertaking, and in connection with the Panama Canal and the Venezuela-Guiana boundary question. The interference of the United States in Mexico, resulting in the withdrawal of the French in 1866, and President Cleveland's declaration to Great Britain in connection with the Venezuelan boundary dispute in 1895, are the notable examples of such recognition. Notwithstanding the protests of the United States Government, during the progress of the Civil War, the French had secured a foothold in Mexico and attempted to install Maximilian, an Austrian prince, on the Mexican throne. With the conclusion of peace a formal demand for withdrawal was made, and General Sherman was sent to the Mexican frontier with a large force. After some delay in negotiations the French Emperor withdrew his troops, and Maximilian was left to his fate. In the Venezuelan affair, representations having been made by our Government that the action of Great Britain was a violation of the Monroe Doctrine, the latter yielded to the suggestion of the United States and consented to an arbitration, thus effecting an amicable settlement. It has all the force of a first principle in the United States but not in international law.

MONSEIGNEUR (mon-sân-year), a title of dignity in France. Under Louis XIV. the dauphin was styled monseigneur, without any addition. Princes, dukes and peers, archbishops, bishops (who adopted the title at the close of the 17th century), cardinals, marshals of France, presidents of parliament, etc., were addressed by this title.

MONSIEUR (mo-syeu), used without any addition, formerly in France designated the king's eldest brother, though, in addressing him, the title Monseigneur was used. The last prince so called was the Comte d'Artois, brother of Louis XVIII. In common use it answers both to the English sir and Mr., and is also used before titles.

MON'SOON, the name given to a certain modification or disturbance of the

regular course of the trade-winds which takes place in the Arabian and Indian seas. Between the parallels of 10° and 30° south latitude the eastern trade-wind blows regularly, but from the former parallel northward the course is reversed for half the year, and from April to October the wind blows constantly from the southwest. During the other six months of the year the regular northeast trade-wind prevails. These two alternating winds are the monsoons proper, but the name is now commonly given to similar alternating winds in any region.

MONSTER, or Monstrosity, a term applied in anatomy and physiology to living beings which exhibit from birth onward some important abnormal features in structure, or present notable deviations from the normal type of their kind. From the earliest times writers have argued for the production of such ideal monsters by the intercourse of demons and women, of brutes and men; and witchcraft, magic, spell, divine vengeance—and, more lately, the effect upon the mother's mind of fright, terror, dreams, etc., have each and all been credited, but equally erroneously, with causing malformations and abnormalities in the yet unborn child or embryo. Teratology can explain most, if not all malformations, as results of abnormal growth or disease. These so-called "freaks of nature" are in truth the results of morbid actions and operations in the living organisms, as well defined, but not yet so well known, as are those of the healthy and normal body.

MON'STRANCE, or **REMONSTRANCE** is the sacred vessel in which, in the Roman Catholic Church, the host is shown to the people at benedictions, processions, and other solemnities. Its use probably dates from the establishment



Monstrance.

of the festival of Corpus Christi in 1264 by Pope Urban IV. The earliest monstrances known date from the 14th century, and are made in the form of a Gothic tower. The most common form now consists of a chalice-footed stand of some precious metal, and a circular repository, usually a transparent pyx, surrounded by sun-like rays. In the Greek Church the monstrance is shaped like a coffin.

MON'TAGU, Lady Mary Wortley, famous for her brilliant letters, was born in 1689, and died in 1762. She was the eldest daughter of Evelyn Pierrepont,

afterward duke of Kingston. Her beauty and elegance and her wit and vivacity rapidly gained her admiration and influence, and she became familiarly acquainted with Addison, Congreve, Pope, and other distinguished writers. In 1716 Mr. Montagu was appointed ambassador to the Porte, and Lady Mary accompanied him to Constantinople, where they remained from January, 1717, to May, 1718. It was during this period that Lady Mary's famous "Turkish Letters" were written. On her return to England she resumed her ascendancy in the gay world of wit and fashion. Her letters are marked by great vivacity and graphic power, together with keen observation and independent judgment. Lady Mary has another claim to remembrance in her courageous adoption of the Turkish practice of inoculation for smallpox in the case of her own children, and for her energy in promoting its introduction into England, in the face of a storm of obstinate prejudice.

MONTAIGNE (mon-tān'), Michel Eyquem de, the famous French essayist, was born in 1533 at the castle of Montaigne, in Périgord. In 1580 he published the first two books of his *Essais*, and immediately afterward set out on a journey through Germany, Switzerland, and Italy to restore his health, which had been shattered by the attacks of a hereditary disease. In 1582 and 1584 he was chosen mayor of Bordeaux. In 1588 he republished his *Essais*, with the addition of a third book. After a last visit to Paris (in the course of which he was thrown into the Bastille for a short time by the leaguers) Montaigne seems to have dwelt quietly in his château. He died of quinsy in 1592.

MONTANA (mōn-tā'na), one of the United States organized as a territory in 1864 out of portions of the territories of Idaho and Dakota, admitted as a state in 1889. It is bounded on the north by the Canadian provinces of British Columbia, Alberta, and Assiniboia on



State seal of Montana.

the east by the Dakotas, on the south by Wyoming and Idaho. It ranks third in size among the states of the Union. Its area is 146,080 sq. miles. The eastern three-fifths of the state consist of rolling plains, lying at an elevation of from 2000 feet in the northeast to about 4000 feet among the foothills of the Rocky Mountains, which take up the western portion. The Main Divide runs from Yellowstone Park for some distance

along the southwestern boundary, after which it turns eastward and then crosses the state obliquely in a northwestern direction. A great longitudinal basin separates the Main Divide from the Bitter Root Mountains which form the western boundary. The principal rivers are the Missouri, the Yellowstone and Clark's Fork of the Columbia. The climate is in general dry, exhilarating, and healthful. The average mean temperature for the state is 70° for the warmest and 11° for the coldest month. The rainfall is exceedingly scanty and irrigation is almost necessary everywhere for agriculture.

Building materials such as limestone, slate, granite, sands, and clay are abundant, and there are large deposits of marble of various hues. Bituminous coal and extensive beds of lignite exist in the east along the Missouri and Yellowstone rivers, while petroleum is also found. Copper is abundant, lead, iron, gold, silver ores exist.

In the western part of the state it is only in exceptional years that the rainfall is inadequate, and in the northwest corner of the state, on the western side of the mountains, the rainfall is plentiful and certain. Considerable land has been brought under irrigation by the construction of large canals. The irrigated region is confined to the southwest quarter of the state, the supply being obtained from the tributary headwaters of the Missouri and from the Yellowstone river.

Hay is the principal crop, its acreage being more than twice that of all other crops. Native grasses constitute the greater part of the acreage, but alfalfa, clover, and other tame varieties are also grown. Oats, wheat, and barley yield abundant crops. Corn is but little grown, owing partly to the coolness of the nights. Potatoes are a favorite crop, and other vegetables are successfully raised. The apple and other temperate zone fruits flourish, and much interest is being developed in their culture.

The state greatly exceeds any other in the number of sheep and in the production of wool. Formerly, the males were shipped to eastern states to be fed for the market, but with the increased production of alfalfa it is being found possible to fatten them within the state. The number of cattle has also shown a considerable increase, and the breed has greatly improved.

The population is about 300,000. Helena is the capital. The tribal Indians chiefly Crows, Blackfeet, Yankton Sioux, Assiniboin, Gros Ventres, and Pend d'Oreilles, are located on five reservations, embracing an area of 45,000 sq. miles of fine agricultural and grazing land, of which only a small portion is cultivated.

In 1742 the Sieur de la Verendrye traversed the region now included within the state of Montana, and in January, 1743, reached the foot of the Rocky Mountains. Gold was discovered as early as 1852 near the Hellgate river, but the discovery aroused little attention till 1857. In the winter of 1860 rich placers were discovered and an active immigration set in, mining settlements springing up at Banack City on Grasshopper creek,

on the Bighole river, and on North Boulder creek. In May, 1863, gold was discovered at Fairweather Gulch, near Alder creek. The town of Virginia City sprang up near the spot, and within a year it had a population of 4000. The region, which constituted a part of Washington territory, was organized in 1860-61 as Shoshone and Missoula counties. In 1863 the territory of Idaho, including the present Montana, was set off from Washington, and on May 22, 1864, the territory of Montana was erected from land taken from Idaho. In 1874 the seat of government was removed from Virginia City to Helena. On June 25, 1876, occurred the disastrous fight between General Custer and the Sioux Indians under Sitting Bull on the Little Big Horn river.

The prosperity of the territory was increased by the completion of the Northern Pacific railroad in 1883. About 1880 began the development of silver and copper mining, which soon surpassed in importance the gold-mining industry. In January and February, 1884, a constitutional convention framed a constitution which was ratified by the people in November, and application was made to congress for admission into the Union. No action was taken, however, until February, 1889, when an enabling act was passed by congress. On November 8, 1889, Montana was admitted into the Union by proclamation of the president, after a state constitution had been framed and state officers elected. In national elections Montana was republican in 1892 and democratic in 1896. In 1900 it was carried by the Democrats and people's party, and in 1904 and 1908 by the Republicans.

MONTANA, University of, a coeducational state institution at Missoula, Mont., founded in 1895. It maintains a preparatory department and a department of literature, science, and the arts, and offers graduate courses, leading respectively to the degrees of B.A., B.S., M.A., and M.S. There is also a summer school of science and a biological station. Tuition is free except in the law department.

MONT BLANC, the loftiest mountain of Europe, belonging to the Pennine chain of the Alps, and rising 15,781 feet above the sea-level, is situated on the frontiers of France and Italy, and near that of Switzerland. On the s.e. its face is steep; on the n.w. lateral chains are sent off, among which about thirty glaciers are counted. The chief are the glaciers Des Bossons, Bois, Argentiére, and Mer de Glace. The summit was first reached in June, 1786, by the guide Jacques Balmat.

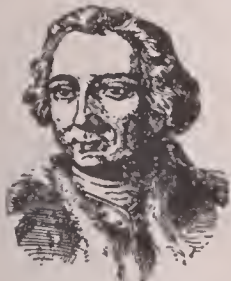
MONTCALM (mōn-kām), Louis Joseph Saint Veran, Marquis de, French general, born in 1712. In 1756 was appointed to the chief command of the French troops in Canada. Here he took Fort Ontario and Fort William Henry and occupied Ticonderoga; but at Quebec in 1759 was completely defeated by General Wolfe on the Heights of Abraham, both commanders being mortally wounded.

MONTCLAIR, a city in Essex co., N. J., on the Del., Lack. and W. and the

N. Y. and Greenwood Lake railways; 5 miles n. by w. of Newark, the county seat, 14 miles w.n.w. of New York City. Pop. 14,175.

MONTE CARLO. See Monaco.

MONTE CRISTO, a small island 6 miles in circumference belonging to Italy, 25 miles s. of Elba, the seat of a penal colony. Dumas has given the



Gen. Montcalm.

name of this isle to the hero of one of his most popular romances.

MONTECU' CULI or, more correctly, **MONTECU' COLI**, Raimondo, Prince of the Empire, and Duke of Melfi, military commander, born near Modena in 1608, died at Linz 1680. In 1664 he gained a great victory over the Turks after having driven them out of Transylvania. In 1673 he was placed at the head of the imperial troops, and checked the progress of Louis XIV. by the capture of Bonn, and by forming a junction with the Prince of Orange in spite of Turenne and Condé. Montecuculi's subsequent advance into Alsace was repulsed by the Prince of Condé. His last military exploit was the siege of Philipsburg.

MONTEFIORE (mon-te-fi-ô'râ), Sir Moses, Jewish philanthropist and centenarian, was born 24th October, 1784, died 28th July, 1885. In 1837 he was chosen sheriff of London, the same year he was knighted, and in 1846 he was made a baronet. His benevolence to Jews throughout the world was unbounded; and he visited Palestine seven times, the last when in his 92d year.

MONTENE' GRO, an independent principality in Europe, in the northwest of Turkey, bounded by Herzegovina, Albania, the Adriatic, and Balmatia. Area, about 3630 sq. miles. The climate is healthy. Forests of beech, pine, chestnuts, and other valuable timber cover many of the mountain sides. Fruit-trees of all kinds abound, especially in the sheltered valleys, where even almonds, vines, and pomegranates ripen. Agriculture is in a very rude and inefficient state, though every cultivable piece of land is planted with Indian corn, potatoes, tobacco, rye, wheat, cabbages, or some other useful plant. Sheep, cattle, and goats are reared in great numbers. Manufactures, with exception of a coarse woolen stuff, are unknown. The population amounts to about 240,000.

MONTEREY (mon-te-râ'i), capital of the state of New Leon, in Mexico, about 100 miles from the Texas frontier. Monterey, which is said to be the most Americanized town in Mexico, has a considerable transit trade. In 1846 it was captured by the United States troops under Gen. Taylor. Pop. 62,266.

MONTESPAN (mon-tes-pân), Fran-

çoise Athenais, Marchioness de, mistress of Louis XIV., born in 1641, was the second daughter of the Duke of Mortemart, and was, in 1663, married to the Marquis de Montespan. Mme. de Montespan bore eight children to the king, four of whom died in infancy. The others were intrusted to the care of Mme. Scarron, afterward De Maintenon. The influence of the favorite mistress was often exercised in public affairs, and her empire over the king continued until about 1679, when a growing attachment to Mme. de Maintenon finally estranged his affections from Mme. de Montespan. She rarely appeared at court after 1685, and in 1691 she entirely quitted it. Her last years were devoted to religious exercises, acts of benevolence, and penitence.

MONTEQUIEU (mon-tes-kyeu), Charles Louis de Secondat, Baron de la Brède et de, born 1689 at the château of La Brède, near Bordeaux; died at Paris 1755. The *Lettres Persanes*, the first of the three great works on which his fame principally rests, appeared in 1721. Other works of less importance followed; and in 1728 Montesquieu was admitted to the French Academy. He gave up his president's office in 1726, and then visited Germany, Hungary, Italy, Holland, and England. In England he stayed for eighteen months, and imbibed a deep admiration for its social and political institutions. He returned to France in 1731, and in 1734 he published his *Considérations sur les Causes de la Grandeur et la Décadence des Romains*. In 1748 *L'Esprit des Loix*, the result of twenty years of labor, was published, and at once placed its author among the greatest writers of his country. The scope of the work is perhaps best indicated by the sub-title of the original edition, which describes it as a treatise on the relation which ought to exist between the laws and the constitution, manners, climate, religion, commerce, etc., of each country. Among his lesser works are *Dialogue de Sylla et d'Eucrate*, *Le Voyage de Paphos*, *Essai sur le Goût* (unfinished), *Arasce et Isménie* (probably a work of his youth), *Lettres Familières*, etc.

MONTEVID'EO, capital of Uruguay is situated on a small peninsula on the north coast of the estuary of the La Plata, 130 miles east-southeast of Buenos Ayres. Pop. 250,000, one-third of whom are foreigners.

MONTEZU'MA, Aztec emperor of Mexico when Cortez invaded the country in 1519. Influenced by an ancient prophecy, he at first welcomed the Spaniards; but when he discovered that they were no supernatural beings, he secretly took measures for their destruction. Cortez on learning this seized Montezuma, and compelled him to recognize the supremacy of Spain. The Aztecs immediately rose in revolt, and refused to be quieted by the appearance of Montezuma. While urging them to submission he was struck on the temple with a stone and fell to the ground. Cut to the heart by his humiliation, he refused all nourishment, tore off his bandages, and soon after expired.

MONTFORT, Simon de, Earl of Lei-

cester, famous in the constitutional history of England, was born in France between 1195 and 1200. He was the youngest son of Simon de Montfort, Earl of Leicester, the "scourge of the Albigenses." He won the favor of Henry III. and married Elcanor, countess dowager of Pembroke, and sister of the king. He was conspicuous among those who extorted the Provisions of Oxford from the king in the "Mad Parliament" in 1258; and he was the leader of the barons in the so-called "Barons' War" that followed. In 1264 he agreed to submit the question of the king's right to repudiate the Provisions to Louis XI. of France: but when the latter, by the Mise of Amiens, decided in favor of Henry, De Montfort refused to be bound by the decision. Both sides took up arms and at the battle of Lewes (May 14, 1264) the king was defeated and taken prisoner. The Mise of Lewes, to which Henry III. agreed, contained the outlines of a new constitution, in which the principle of representative government was recognized. The king accepted the constitution on Feb. 14, 1265; but Prince Edward and the Mortimers raised the standard of revolt. At the battle of Evesham (Aug. 4, 1265) De Montfort was defeated and slain. His memory was long revered by the people as a martyr for the popular liberty.

MONTGOM'ERY, or **MONTGOMERY-SHIRE**, an inland county in North Wales, has an area of 495,082 acres, consisting mostly of wild, rugged, and sterile mountains, varying from 1000 to 2000 feet in height. It contains, however, some fine and fertile valleys, the most extensive and fruitful of which is that of the Severn, the principal river. Pop. 54,892.

MONTGOMERY, capital of Alabama, on the left bank of the navigable Alabama river. The principal buildings are the state-capitol, the United States court-house, and a number of churches. Montgomery contains several foundries, flour and oil mills, and a cotton factory; and carries on an extensive trade. Pop. 32,416.

MONTH, a period of time derived from the motion of the moon generally one of the 12 parts of the calendar year. The calendar months have from 28 to 31 days each, February having 28, April, June, September, and November 30, the rest 31. Month originally meant the time of one revolution of the moon, but as that may be determined in reference to several celestial objects there are several lunar periods known by distinctive names. Thus the anomalistic month is a revolution of the moon from perigee to perigee, average 27 days 13 hrs. 18 min. 37.4 sec.; the sidereal month, the interval between two successive conjunctions of the moon with the same fixed star, average 27 days 7 hrs. 43 min. 11.5 sec.; the synodical, or proper lunar month, the time that elapses between new moon and new moon, average 29 days 12 hrs. 44 min. 2.9 sec. The solar month is the twelfth part of one solar year, or 30 days 10 hrs. 29 min. 5 sec.

MONTHS, the Derivations of the Names of the, January—the Roman

MONTMORENCY

Janus presided over the beginning of everything; hence the first month of the year was called after him. February—the Roman festival Februs was held on the 15th day of this month, in honor of Lupercus, the god of fertility. March—named from the Roman god of war, Mars. April—Latin, Aprilis, probably derived from aperire, to open; because spring generally begins, and the buds open in this month. May—Latin Maius, probably derived from Maia, a feminine divinity worshipped at Rome on the first day of this month. June—Juno, a Roman divinity worshipped as the Queen of Heaven. July—(Julius) Julius Cæsar was born in this month. August—named by the Emperor of Augustus Cæsar, B.C. 30, after himself, as he regarded it as a fortunate month, being that in which he had gained several victories. September (septem, or 7)—September was the seventh month in the old Roman calendar. October (octo, or 8)—Eighth month of the old Roman year. November (novem, or 9).—November was the ninth month in the old Roman year. December (decem, or 10)—December was the tenth month of the early Roman year. About the 21st of this month the sun enters the Tropic of Capricorn, and forms the winter solstice.

MONTMOREN'CY, a small river of Canada, which rises in Snow lake, prov. of Quebec, flows south, and joins the St. Lawrence 8 miles below Quebec. Near its mouth are the Falls of Montmorency, which have a breadth of about 50 feet, and a perpendicular descent of 242 feet.

MONTMORENCY (mon-mo-rân-si), the name of a noble family of France and the Netherlands, derived from the village of Montmorency near Paris. One of its most distinguished members was Anne de Montmorency, first duke of Montmorency, Constable of France, and a distinguished general, born in 1492. He distinguished himself at the battle of Marignano in 1515, and for his valor at Bicocca in 1522 was made marshal. He was taken prisoner along with Francis I. at the battle of Pavia in 1525, but was soon after ransomed. In 1536 he defeated Charles V. Francis I. conferred on him the dignity of Constable in 1538. In 1551 he was made a duke. In 1557 he lost the battle of St. Quentin against Philip II. of Spain, and was taken prisoner, but he regained his freedom by the Peace of Cateau-Cambrésis in 1559. Under Charles IX. he joined the Duke of Guise and Marshal St. André in forming the famous triumvirate against Condé and the Huguenots. At the battle of Dreux in 1562 Montmorency was made prisoner by the Huguenots; on the renewal of the civil war he gained a decisive victory over them at St. Denis, November 10, 1567, though the following day he died of his wounds.

MONTPELIER, the capital of the state of Vermont and of Washington co., on the Winooski or Onion river, here crossed by a stone bridge, and on the Mont. and Wells river and the Cent. Vt. railways; 40 miles s.e. of Burlington, 205 miles n.n.w. of Boston. The principal industry is the quarrying of the celebrated Barre granite; other industries

are the manufacture of saw-mill, candy-making, and other machinery, leather, organ and piano springs, and clothes-wringers and washing-machines. Pop. 10,100.

MONTPELLIER (mon-pel-yā), chief town of the department of Hérault, in France, is situated in a picturesque region, on the Lez, about 6 miles north of



State capitol, Montpelier, Vt.

the Mediterranean and 80 miles w.n.w.
of Marseilles. Pop. 76,364.

MONTREAL, the largest city and the commercial capital of the Dominion of Canada, is situated on an island of the same name, formed by the mouths of the Ottawa, where, after a course of 750 miles, it debouches into the St. Lawrence. It is built upon the left or northern bank of the St. Lawrence, and is situated 180 miles s.w. of Quebec, and 985 miles by river from the Atlantic Ocean. Behind the town rises the Mount Royal (Mont Real), from which it derives its name, and which is reserved as a public park. Situated at the junction of the inland and the ocean navigation, it has a harbor with three miles of wharfage accessible to steamers of the deepest draught. It is also the chief terminus of the Grand Trunk Railway, and the



eastern terminus of the Canadian Pacific Railway. The city is divided into distinctly marked English and French quarters. The chief public buildings are the court-house, custom-house, city hall, etc.; and the principal churches are St. Peter's Cathedral, the church of Notre Dame, St. Patrick's, Christ Church Cathedral, St. Andrew's, St. Paul's, etc. M'Gill University, Presby-

MOODY

terian College, Wesleyan Theological College, Congregational College, Anglican Diocesan College, Bishop's College, and University, the Montreal School of Medicine and Surgery, are the leading Protestant educational institutions; those of the Roman Catholics comprise Laval University, St. Mary's College, Montreal College, Hochelaga Convent, etc. Among the industrial establishments of Montreal are iron foundries, distilleries, breweries, sugar-refineries, soap and candle works; and there are manufactures of cotton, silk, boots and shoes, paper, carpets, tobacco, hardware, edge-tools, floor-cloth, carriages, etc. The Grand Trunk railway, which connects the railways of Canada with those of the United States, crosses the St. Lawrence at Montreal by the great Victoria bridge (formerly tubular) 9184 feet in length, constructed in 1854-59. Pop. 318,165, of whom the majority are Roman Catholics and of French origin.

MONTROSE, James Graham, Marquis of (1612-1650), son of the 4th earl of Montrose, was born at Montrose in 1612. In 1637 Montrose joined the covenanters in their resistance to episcopacy. In 1639 he was one of the



James Graham, Marquis of Montrose.

leaders who were appointed to confer with Charles I., after which he went over to the royalist side, was created a marquis, and made commander of the royal forces in Scotland. He was defeated at Philiphaugh by Leslie, and fled to Norway in 1646. In March, 1650, he returned, landing in Orkney with a small body of followers. He failed, however, in raising an army, and a month later was surprised and captured in Ross-shire, and was conveyed to Edinburgh, where he was hanged and quartered 21st May, 1650.

MOODS (in Logic). See Syllogism.

MOODY, Dwight Lyman, American evangelist, was born at Northfield, Mass. 1837. In 1856 he removed to Chicago, became active in mission work, and established a Sunday school which numbered over a thousand children. In 1873 he visited Great Britain and Ireland with Ira D. Sankey, the singer, and in 1875 held a long series of meetings in Brooklyn and Philadelphia, and in 1876 in New York. Similar services followed in many large cities throughout the country. In 1882 a second visit to England was made. He died at Northfield in 1899. He published numerous discourses and works of a popular character.

MOODY, William Henry, American lawyer, was born in 1853, in Newbury, Essex co., Mass. From 1890 to 1895 he was district attorney for the Massachusetts Eastern District, member 54th congress to fill vacancy; also member 56th and 57th congresses. In May, 1902, he became secretary of the navy and in 1904 he was appointed attorney-general which he held until 1906, when he resigned.

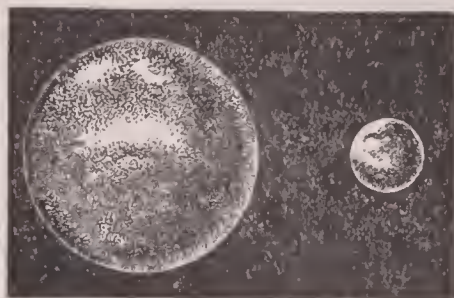
MOON, The, one of the secondary planets and the satellite of the earth revolves round the latter in an elliptic (almost circular) orbit, in one sidereal month (see Month), at a mean distance of 238,818 miles, her greatest and least distances being 252,948 and 221,593 miles. Her mean diameter is 2159 miles. Her surface is about $\frac{1}{8}$ (14,600,000 sq. miles) of that of the earth; her volume $\frac{1}{5}$; her mass about $\frac{1}{81}$; and her mean density a little more than $\frac{1}{4}$. A mass weighing 1 lb. on the earth's surface would weigh about 2.64 ozs. on the moon's surface. For every revolution in her orbit, the moon rotates once on her axis, so that the same portion of her surface is constantly turned toward the earth; but in virtue of an apparent oscillatory motion, known as libration (which see), about $\frac{1}{4}$ of her surface is presented at one time or another to terrestrial observers. If the moon's orbit were in the plane of the ecliptic, solar and lunar eclipses would occur monthly. Her orbit is, however, inclined $5^{\circ} 8' 48''$ to the ecliptic, so that her meridian altitude has a range of 57° , and she occults in course of time every star within $5^{\circ} 24' 30''$ of the ecliptic. An eclipse of the moon occurs when she passes into the



Orbit of the moon, showing the lunar phases.

earth's shadow; when she prevents the sun being seen there is an eclipse of the sun. (See Eclipse.) The changes in the appearance of the moon, described by the words waxing and waning, are known as phases. The four chief phases, occurring at intervals of 90° in the lunar orbit, are New Moon, when she is between the earth and sun (i.e. in conjunction with the sun), and so turns an unilluminated side to the earth; First Quarter, when one-half of her illuminated disc (i.e. one quarter of the entire lunar surface) is visible; Full Moon, when her whole illuminated disc is presented to the earth; and Last Quarter, when once more only half of her disc is

visibly illuminated. Between new moon and full moon the moon is said to wax; on the rest of her course she wanes. When more than a semicircle is visible she is said to be gibbous; when new or full she is said to be in her syzygies. On the visible portion of the lunar surface there is either no atmosphere or an exceedingly rare one, and no traces of organic life have been observed. As each portion is alternately in sunlight and in shade for a fortnight at a time, and as no atmosphere has been detected, it is conjectured that the lunar extremes of heat and cold far exceed the greatest terrestrial extremes. The surface of the moon is mainly occupied by mountains, most of which are named after eminent scientific men. They are



Comparative dimensions of the earth and the moon.

sometimes detached as precipitous peaks, more frequently they form vast continuous ranges, but the most prevalent form is that of crater-mountains, sometimes 8 to 10 miles in diameter, and giving evident traces of volcanic action. Certain crater-like formations, which have still greater diameters are generally spoken of as "walled plains." Larger still are the "gray plains," which were at one time taken for seas, before the absence of water from the lunar surface was demonstrated. They may possibly be the floors of old seas. Some of the mountains have been estimated to be over 24,000 feet in height, from observation of their shadows. Very peculiar ridges of comparatively small elevation extend for great distances, connecting different ranges or craters. The so-called "rilles" or "clefs" are huge straight furrows of great length (18 to 90 miles), now generally believed to be caused by cracks in a shrinking surface. There are also valleys of various sizes, and "faults" or closed cracks, sometimes of considerable length. In reading descriptions of the visible peculiarities of the moon, it should be remembered that the highest telescopic power yet applied to that planet is only equivalent to bringing it within about 40 miles of the naked eye. The attraction of the sun for the earth and the moon tends to diminish their mutual action. When the moon is at new or full (in syzygies) the mutual attraction of the earth and moon is lessened by the sun more than usual, whereas it causes a small increase in the mutual action when the moon is in quadrature (when the line from the earth to the moon is at right angles to the line from the earth to the sun); again, the sun exerts a direct tangential acceleration on the moon which is positive (or toward the sun) when the moon is nearer the sun

than the earth, and negative when the moon is further away than the earth; these two produce what is called the moon's variation, which, on the whole, is such that in each lunation the moon's velocity is greatest when she is in syzygies and least when nearly in quadrature. For the influence of the moon on tides see Tides.

MOORE, Clement Clarke, American poet and educator, was born in New York in 1779. He compiled a Hebrew and English Lexicon, and published a collection of Poems, among which is "Twas the Night Before Christmas," or more properly, "A Visit from Saint Nicholas," through which he is best remembered. He died in 1863.

MOORE, George, a British novelist and dramatist, born in Ireland in 1853. His novels, *A Modern Lover*, *A Mummer's Wife*, and *Esther Waters*, aroused vigorous protest as being unduly realistic. Among his later works are *Sister Teresa*, *Confessions of a Young Man*, *Miss Fletcher*, *Impressions and Opinions*, *Modern Painting*, and *The Celibates*.

MOORE, Sir John, a celebrated British general, was born at Glasgow in 1761, killed at Corunna in 1809. Having obtained an ensign's commission in the 51st regiment he served at Minorca in the American war, as brigadier-general in the West Indies (1795), in Ireland during the rebellion of 1798, in Holland in 1799, and in Egypt in 1801, where he was severely wounded in the battle which cost Sir Ralph Abercrombie his life. Moore was now regarded as the greatest living British general, and in 1805 he was knighted. In 1808 he was appointed commander-in-chief of the British army in Portugal to operate against Napoleon. He advanced to Salamanca in spite of the gravest difficulties, but was finally compelled to retreat to Corunna, a distance of 200 miles, in face of a superior force. This he accomplished in a masterly manner; but the absence of the fleet to receive his army forced him to a battle against Marshal Soult, in which Moore fell, mortally wounded, in the hour of victory (16th January, 1809).

MOORE, Thomas, the national poet of Ireland, was born in 1779 in Dublin; died near Devizes in 1852. Moore in 1806 published his *Odes and Epistles*. In 1807 he agreed to write words for a number of Irish national airs, arranged by Sir John Stevenson. In these Irish Melodies, which were not finished till 1834, he found the work for which his genius was peculiarly fitted, and it is on them that his poetic reputation will mainly rest. With *The Intercepted Letters*, or *The Twopenny Post Bag*, by Thomas Brown the Younger (1812), Moore entered upon the field of political and social satire, in which his wit and playfulness found good account; other works of this kind are the *Fudge Family in Paris* (1818), *Rhymes on the Road* (1823), *Memoirs of Captain Rock* (1824), etc. His most ambitious work, the gorgeous Eastern romance of *Lalla Rookh*, was published in 1817. *The Life of Sheridan* was produced in 1825, and *The Epicurean*, a prose romance in 1827. Next came the *Life of*

Lord Byron, and the Life of Lord Edward Fitzgerald.

MOORISH ARCHITECTURE, is that form of Saracenic architecture which was developed by the Moslem conquerors of Spain in building their mosques and palaces. Its main characteristics are—the horse-shoe arch, varied by the trefoil, cinquefoil, and other forms of arch; profuse decoration of interiors by elaborately designed arabesques in low relief, enriched by colors and gilding, as well as by geometrical designs worked in



Thomas Moore.

mosaics of glazed tiles; the slenderness of the columns in proportion to the supported weight; and the curious stalactitic pendentives by which the transition is effected from the rectangular ground plan to the arched or domed roof. An important specimen of this style is the mosque of Cordova, now the cathedral, which was begun by Caliph Abd-el-Rahman (786 A.D.), completed by his son, and subsequently much altered.



Moorish doorway, Cordova.

It consisted originally of eleven aisles, and the eight aisles which were afterward added (976-1001) made it one of the largest buildings in Europe, but the effect of its great extent, 420 feet by 375, is marred by its height, which is only about 30 feet to the roof. Another notable specimen of Moorish architecture is the Giralda or cathedral-tower of Seville. It is supposed to have been built by Abú

Yusúf Kakúb (1171 A.D.) as a tower of victory, and was used by the Moslems as a minaret or mueddin-tower. The base is a square of about 50 feet, from which the tower rises straight for 185 feet, and is now crowned by a belfry added in the 16th century. The lower part of this tower is nearly plain, but from about



Moorish decoration—court of the Alhambra.

one-third of its height upward it is enriched by sunk panels filled with ornamentation in relief, which give lightness and grace to the structure without affecting its general massiveness. The most characteristic Moorish palace in existence is the Alhambra in Granada, an immense structure of simple and rather forbidding exterior, but within gorgeous almost beyond description. (See Alhambra.) In this palace are found to perfection the distinctive characteristics of Moorish architecture.

MOORS, a Mohammedan, Arabic-speaking race of mixed descent, forming part of the population of Barbary and deriving their name from the Mauri, the ancient inhabitants of Mauretania, whose pure lineal descendants are, however, the Amazirgh, a branch of the Berbers. The modern Moors have sprung from a union of the ancient inhabitants of this region with their Arab conquerors, who appeared in the 7th century. As the Mohammedan conquerors of the Visigoths in Spain (711-713) came from North Africa, the name Moor was also applied to them by Spanish chroniclers, and in that connection is synonymous with Arab and Saracen. These Moors pushed northward into France, until their repulse by Charles Martel at the great battle of Tours in 732, after which they practically restricted themselves to Spain south of the Ebro and the Sierra Guadarrama. Here, for centuries, art, science, literature, and chivalry flourished among them, while the rest of Europe was still sunk in the gloom of the dark ages. Their internal dissensions and divisions, however, weakened them in face of the new Christian kingdoms

of Aragon and Castile, and before the close of the 13th century their possessions were limited to the kingdom of Granada. This, too, was finally subdued by Ferdinand the Catholic in 1492; and while great numbers of the Moors emigrated to Africa, the remainder, under the name of Moriscos, assuming in great part a semblance of Christianity, submitted to the Spaniards. The cruel proselytizing zeal of Philip II., however, excited a sanguinary insurrection among the Moors in 1568-70, which was followed by the banishing of many thousands, while Philip III. completed the work in 1610 by finally expelling the last of these, the most ingenious and industrious of his subjects. Between 1492 and 1610 about 3,000,000 Moriscos are estimated to have left Spain. The expulsion of the Moors was one of the chief causes of the decadence of Spain; for both agriculture and industries fell into decay after their departure. The expelled Moors, settling in the north of Africa, founded cities from which to harass the Spanish coasts, and finally developed into the piratical states of Barbary, whose depredations were a source of irritation to the civilized Christian powers even till well into the 19th century.

MOOSE. See Elk.

MORADABAD, a town of India in Rohilkhand, in the United Provinces, 75 miles east of Meerut, on the Ramganga. Pop. 75,176.—The district has an area of 2281 sq. miles. Pop. 1,179,398.

MORaine. See Glaciers.

MORAL PHILOSOPHY. See Ethics.

MORAN, Thomas, American etcher and landscape painter, was born at Bolton, Lancashire, in 1837, and came to Philadelphia with his parents. He then studied oil painting in Paris and Italy. He returned to the United States in 1871 and produced the picture of the "Grand Cañon of the Yellowstone," now filling a panel in the Capitol at Washington. In 1873 he completed a picture of "The Chasm of the Colorado," which was purchased by congress as a companion of the Yellowstone picture. He was elected a member of the National Academy in 1884. Among his smaller pieces are: "The Lost Arrow," "The Conemaugh in Autumn," "The First Ship," "The Track of the Storm," "Ponce de Leon in Florida," "New York from Communipaw," and "After a Thaw." His illustrations include designs for Longfellow's *Hiawatha* and Whittier's *Mabel Martin*. Both he and his wife, Mary Moran, are etchers, and members of the British Society of Painter-Etchers.

MORAVIA, a northwestern province or crownland of the Austrian empire, area, 8578 sq. miles. It is inclosed by the Carpathians and other mountains. The minerals include iron, coal, graphite, and slate. Nearly 97 per cent of the soil is productive, the chief crops being rye, oats, barley, potatoes, beet-root, and flax. Fruit is very abundant, and large quantities of wine are annually produced. Sheep in great numbers, and cattle, are reared. Moravia is the most important manufacturing province of the empire, after Austria Proper and Bohemia. Its woolen industries are of

world-wide fame, and linen and cotton, beet-root sugar, iron and steel goods, machinery, beer, and spirits. Pop. 2,276-870.

MORAVIAN BRETHREN, also called United Brethren, a Protestant sect or church which originally sprang up in Bohemia after the death of John Huss. After the sanguinary religious war which prevailed in Bohemia until 1627 they were everywhere almost annihilated. Their doctrines were still, however, secretly cherished in Moravia, and in 1722 a colony emigrated thence, and were invited by the Lutheran Count Zinzendorf to settle on his estate near Berthelsdorf, in Saxony, where they built the town of Herrnhut, still the headquarters of the church. The doctrines of the brethren had hitherto been more in harmony with the Calvinistic than with the Lutheran form of Protestantism, but under the influence of Count Zinzendorf, who himself became a bishop, they attached themselves to the Lutheran Church.

MORAY, or **MURRAY**, James Stuart, Earl of, half-brother of Mary Queen of Scots, natural son of James V. of Scotland and Margaret Erskine, born about 1533. On the deposition of Mary he was appointed regent, defeated her forces at Langside on her escape from Lochleven (1568), and appeared as evidence against her at her trial in England. In 1570 he was shot in the streets of Linlithgow.

MORBIHAN, (mor-bi-än) a northwestern department of France, on the Bay of Biscay; area, 2624 sq. miles. The chief town is Vannes. Pop. 563,468.

MORE, Sir Thomas, a chancellor of England; born in London in 1480, beheaded 1535. About 1502 he became a member of parliament, and immediately made for himself a place in history by upholding the privileges of the House of Commons to treat all questions of supply as their own exclusive business. On the accession of Henry VIII. he was made under-sheriff of London. In 1514 he was envoy to the Low Countries, soon after was made a privy-councillor, and in 1521 was knighted. In 1532 he became speaker of the House of Commons, and in 1529 succeeded Wolsey in the chancellorship. He was requested to take the oath to maintain the lawfulness of the marriage with Anne Boleyn. His refusal to do so led to his committal to the Tower, trial for misprision of treason, and execution.

MOREAU (mo-rō), Jean Victor, French general, born at Morlaix, in Bretagne, in 1763, died 1813. He was named commander-in-chief of the army of the Rhine and Moselle in 1796. His conduct of the operations, and especially of the retreat to the French frontier in the face of a superior army, showed exceptional strategic power. In 1799 he was in command of the army of Italy, and next year had the command of the armies of the Danube and the Rhine. Being found guilty of participation in the conspiracy of Pichegru and Cadoudal against Napoleon (1804), he had to go into exile. He was subsequently induced to aid in the direction of the allied armies against his own country, but was mortally wounded in the battle

before Dresden in 1813, and died a few days later.

MORE'LOS, an inland state of Mexico, south of Mexico, containing the volcano of Popocatepetl; area, 1776, sq. miles; Pop. 141,565.

MO'REY, Samuel, American inventor, was born in Hebron, Conn., in 1762. In 1793 he succeeded in constructing a small steamboat, which was moved by a wheel at its prow. In 1795 Morey patented a crank-motion steam-engine for use in boats. Two years afterward he built a boat with paddle wheels on each side, and operated it successfully on the Delaware. He had the problem of steam navigation practically solved; but misfortunes prevented him from following up his success, and to Robert Fulton went the honor that might otherwise have been Morey's. He died in 1843.

MORGAN, Edwin Dennison, an American politician, governor of New York from 1859 to 1863. He was born at Washington, Berkshire co., Mass., in 1811. From 1849 to 1853 he was a member of the state senate. He was a delegate to the first national convention of the republican party at Philadelphia, and was one of the vice-presidents of that assembly. In 1858 he was elected governor of New York, and was re-elected in 1860. In the latter term it fell to him to supervise and control the sending of New York's quota of troops to the front in defense of the Union, and when he left office in 1863 more than 223,000 volunteers had been enlisted in the Federal service. In 1861, in order that he might better carry out the administration's desires, New York state was made a military district, and he was placed in command with rank of major-general. He died in 1883.

MORGAN, John Hunt, American soldier, prominent on the confederate side in the civil war, was born at Huntsville, Ala., in 1825, moved with his parents to Kentucky in 1830. In 1861 with about two hundred men and the guns of the militia company of which he was captain, he escaped to the confederate lines. His great success in daring and unexpected raids gave him the command of a cavalry brigade, and after promotion to brigadier-general made the "Christmas Raid" into Kentucky, for which he was thanked by the confederate congress. In June, 1863, with about 2500 men he crossed the Ohio river into Indiana and was closely pursued by Generals Hobson and Shakerford, and opposed everywhere by the militia. A sudden rise in the Ohio river prevented him from recrossing the river and he was captured and confined in the Ohio state prison at Columbus. On November 27th he escaped and reached the confederate lines in safety. On September 4, 1864, in Greenville, Tenn., he was betrayed by an inmate of the house in which he was sleeping, and was shot while attempting to escape.

MORGAN, John Pierpont, American banker and financier, was born at Hartford, Conn., in 1837. In 1857 he entered the banking house of Duncan, Sherman & Co., in New York City. In 1860 he became agent for George Peabody & Co., of London, and in 1864 became a

partner in the firm of Dabney, Morgan & Co., In 1871 he entered as a partner the banking firm of Drexel, Morgan & Co., which later was changed to the firm of J. P. Morgan & Co. The United States Steel Corporation, the Northern Securities Company, and the Atlantic shipping combination are examples of his genius in reorganization and combination.

MORGAN, John Tyler, American politician, born at Athens, Tenn., in 1824. He removed to Alabama with his parents in 1833. In 1861 he was a delegate from Dallas co., to the Alabama state convention which passed the ordinance of secession, and he enlisted as a private in the Fifth Alabama Infantry, of which he ultimately became lieutenant-colonel. In 1862 he recruited the Fifty-first Alabama regiment and became its colonel. After the war he again entered politics as an elector-at-large on the Tilden ticket. In 1877 he was elected to the United States senate, of which body he remained a member, receiving his fifth re-election in November, 1900. He died in 1907.

MORGAN, Lewis Henry, American ethnologist, was born near Aurora, N. Y., in 1818. Morgan, after leaving college, organized "The Grand Order of the Iroquois." The limits of the grand order were to be the territory anciently occupied by the Iroquois. Morgan lived among the existing tribes, in order to master their social organizations and forms of government, and his scientific interests assumed substantial form in the celebrated work, *The League of the Iroquois*, in which the author traced the social organization, government, daily occupations, and customs of this wonderful league.

In 1858 Morgan discovered, in visiting a camp of Ojibwa, that their system of kinship was essentially the same as among the Iroquois. This was the revelation that determined Morgan's enduring fame. His *System of Consanguinity and Affinity of the Human Family* is a work essential to all studies on primitive sociology. His *Ancient Society* is a comprehensive and philosophical work. He died in 1881.

MORGAN, Sir Henry, the most famous of English buccaneers, was born at Llanrhynny, Glamorganshire, Wales, in 1635. He was kidnapped at Bristol when a boy, and sold as a servant in Barbadoes, whence after a time he worked his way to Jamaica. There he joined the buccaneers, and by 1663 was in command of a privateer of his own. He took and sacked Puerto Príncipe, and then sailed to Puerto Bello, Panama, which he captured after a brilliant attack. After levying a heavy ransom Morgan sailed for Jamaica. Later in the year he led an expedition which ravaged the entire Cuban coast, and in January, 1669, with a fleet of eight ships, he started on his famous expedition against Maracaibo. The capture and sack of the town was followed by the greatest excesses on the part of the buccanners, who were surprised in their orgies by the arrival of three Spanish ships of war. Morgan assembled his half-drunken comrades, manned his ships, and after parleying with the Spanish commander

suddenly attacked him, totally defeated him, and escaped. In August, 1670, he ravaged the Cuban and mainland coasts, and in January, 1671, he captured and plundered the city of Panama, one of the richest in Spanish America. The attack had been made after a peace had been arranged between England and Spain, and Morgan was sent to England, but he took enough gold along with him to secure his vindication, eventually receiving knighthood and high favors from the king; was sent back to Jamaica as lieutenant-commander and commander-in-chief of his majesty's forces in the colony. He died in 1688.

MORGAN, William, American Mason, whose disappearance under peculiar circumstances in 1826 caused the organization of the Anti-Masonic party, was born in Culpeper co., Va., in 1775. He suddenly disappeared in 1826, shortly after it had been announced that he intended, in conjunction with one David C. Miller, to publish a book exposing the secrets of Freemasonry. Morgan's book, *Illustrations of Freemasonry*, by One of the Fraternity Who Has Devoted Thirty Years to the Subject, was published in 1826 and was republished at various times thereafter, sometimes under the title of *Free-masonry Exposed and Explained*.

MORGANATIC MARRIAGE, in some European countries, one in which it is stipulated that the wife (who is inferior in birth to the husband) and her children shall not enjoy the privileges of his rank nor inherit his possessions. The common law of Germany permits such marriages only to the high nobility.

MORGUE (morg), a place where the bodies of unknown persons who have perished by accident, murder, or suicide are exposed, that they may be recognized by their friends.

MORION, a helmet of iron, steel, or brass, somewhat like a hat in shape, often with a crest or comb over the top,



Morion of the time of Queen Elizabeth.

and without beaver or visor, introduced into Britain from France or Spain about the beginning of the 16th century.

MORISCO. See Moors.

MORLEY, Right Hon. John, author and politician, born at Blackburn, Lancashire, 1838. He conducted the *Fortnightly Review* from 1867 to 1882, and edited the *Pall Mall Gazette* for three years (1880-83), and *Macmillan's Magazine* for two years (1883-85). He also edited the *English Men of Letters* series, to which he contributed the volume on Burke. He is author of *Critical Miscellanies*; *Voltaire*; *Rousseau*; *Diderot* and the *Encyclopedists*; *Life of Cobden*; *Walpole in the English Statesmen series*; *Life of Gladstone* (1903); etc. He represented Newcastle from 1883 to 1895; and in 1896 became member for the Montrose burghs. Radical in politics, he is a supporter of Irish Home Rule, and

was chief secretary for Ireland in 1886, and again in 1892-95.

MORMONS, a sect founded in 1830 by Joseph Smith, a native of the United States. The distinguishing peculiarities of the sect are—the belief in a continual divine revelation through the inspired medium of the prophet at the head of their church, the practice of polygamy, and a complete hierarchical organization. The supreme power, spiritual and temporal, rests with the president or prophet (elected by the whole body of the church), who alone works miracles and receives revelations. The Mormons accept both the Bible and the Book of Mormon as divine revelations, but hold them equally subject to the explanation and correction of the prophet. The latter mentioned book (in large part a kind of historical romance written by one Solomon Spaulding in 1812) pretends to be a history of America from the first settlement of the continent after the destruction of the tower of Babel up to the end of the 4th century of our era, at which time flourished the legendary prophet Mormon, its reputed author. It was said to have been written on gold plates, and concealed until its hiding-place was revealed to Smith by an angel. The name given to it was evidently owing to the important part which Spaulding had assigned to Mormon and his son Moroni in his novel; but Smith and his coadjutors, instead of confining themselves to the original manuscript, had clumsily engrafted upon it a number of maxims, prophecies, etc., evidently garbled from the sacred volume, and interpolated in such a manner as to involve anachronisms and contradictions. The doctrine of the Mormons is a mixture of materialism and millenarianism, and their most distinctive feature, polygamy, which, though originally condemned in the Book of Mormon, was introduced under a theory of "spiritual wives," and a mysterious system of unrestricted marriage called "sealing." The Mormons first appeared at Manchester, New York, whence they were compelled by the persevering hostility of their neighbors to flee, first to Kirtland in Ohio (1831), then to Nauvoo, the "City of Beauty," in Illinois (1838), and finally to the Salt Lake in Utah (1848). In 1844 the founder, Joseph Smith, was shot by a mob in Carthage prison, where his lawless behavior had brought him. The advance made by Mormonism seems to have been due far more to the abilities of Brigham Young, the successor of Smith, than to the founder himself, who was little better than a dissipated and immoral scamp. Under Young's direction large tracts of land at Salt Lake were brought under cultivation, an emigration fund was established, and a skilful system of propagandism set on foot, by which large numbers of converts were brought from Europe, especially from Great Britain. A state was organized under the name of Deseret. Congress refused to recognize it, but erected Utah into a territory, and Brigham Young was appointed governor of it. He was soon removed by the United States authorities, but after a time the Mormons were left pretty much to themselves. In 1870 congress

passed a bill to compel them to renounce polygamy, or quit the United States. A prosecution was instituted against Brigham Young, who was sentenced to fine and imprisonment. In 1877 Young died and was succeeded by John Taylor, an Englishman, who in turn was succeeded as president by Wilford Woodruff in 1887. In 1890 he proclaimed that polygamy is no longer taught as a doctrine of Mormonism.

MORNING-GLORY, a name given to several climbing plants of the convolvulus family, having handsome purple or white, sometimes pink or pale blue, funnel-shaped flowers.

MORNING-STAR, the planet Venus when it rises before the sun.

MOROCCO, or **MAROCCO**, an empire or sultanate occupying the northwest extremity of Africa, bounded by the Atlantic ocean, the Mediterranean, Algeria and the desert; area, about 300,000 sq. miles. Its most remarkable natural feature is Mount Atlas, the great chain or series of chains extending through it from northeast to southwest, and reaching a height of 12,000 to 15,000 feet. The minerals include gold, silver, copper, iron, and lead in larger or smaller quantities. The flora includes the esculent oak and cork oak; in the higher regions of the Atlas the cedar and Aleppo pine; the date-palm and the dwarf-palm east and south of the Atlas. Agriculture is in the lowest possible condition, and the annual production is calculated barely to supply the wants of the country. The cereal crops include wheat, barley, and maize; but dhurra or millet constitutes the chief support of the population. The vine is cultivated only near towns for the sake of the fresh grapes and for the raisins. All the fruits of the south of Europe are cultivated to some extent. Among the wild animals are the lion, panther, jackal, hyena, wild boar, gazelle, and several species of large antelope. The locust is a cause of much devastation. The ostrich is found on the southern frontiers. Cattle and sheep are reared and the spirited small horses for which the country was once famous are still numerous. There are large numbers of goats, which furnish a principal article of export—the well-known Morocco leather. Fez makes and exports the cloth caps which bear its name. Carpets, embroidered stuffs, pottery, arms are also made. The civilization of Morocco has sunk to a low condition. The education at the schools and at the University of Fez does not go beyond the theology of the Koran. The public libraries, once famous, are now dispersed. Morality is represented as being in a deplorable state. The sovereign or sultan, styled by Europeans emperor, is absolute in the strictest sense. Morocco in ancient times formed part of Mauritania, and about 43 A.D. was incorporated in the Roman Empire. In the latter part of the 7th century the Arabs spread over North Africa, and took possession of Mauritania. Among ruling dynasties since then have been the Almoravides, Almohades, and others. The present dynasty, the ninth, was founded in 1648. In 1814 the slavery of Christians was abolished, and piracy was prohibited in 1817. The conquest of Algeria brought about com-

plications with France, and the plundering of vessels by pirates has often caused troubles with European powers. In 1859 a war broke out with Spain, owing to attacks made by some of the wild tribes upon the Spanish territory, and resulted in a cession of land and an indemnity of \$20,000,000 to Spain. The population is estimated at from 6,000,000 to 6,500,000.

MOROCCO, the capital (conjunctly with Fez) of Morocco, lies in the southwest of the country, on an extensive and fertile plain, 1500 feet above sea-level. Pop. estimated at 40,000 to 50,000.

MOROCCO, a fine kind of leather made from the skins of goats, imported from the Levant, Barbary, Spain, Belgium, etc., tanned with sumach, dyed, and grained, the last process being that which gives it its well-known wrinkled appearance. It is extensively used in the binding of books, upholstering furniture, making ladies' shoes, etc. Imitation moroccas are made from sheep-skins, so perfect in appearance that it is difficult to distinguish them, but they are entirely lacking in the durability of the real article.

MORPHIA, MORPHINE, the narcotic principle of opium, a vegetable alkaloid of a bitter taste, first separated from opium in 1816. It forms when crystallized from alcohol brilliant colorless prisms of adamantine luster. As it is very slightly soluble in water, it is never used alone medicinally, but it readily combines with acids forming salts extensively used in medicine. In small doses it is powerfully anodyne; in large doses it causes death, with narcotic symptoms. It is very commonly administered medicinally by subcutaneous or hypodermic injection, and the practice of injecting morphia has become a not infrequent vice, leading to a diseased mental state known as morphinomania.

MORPHOLOGY, a branch both of zoology and botany which deals with the structure and form of animals and plants respectively, and their different organs, from those of the lowest to those of the highest type. In morphology questions of homology and analogy are of the greatest importance, and morphology may be said to lie at the foundation of all true systems of classification and arrangement.

MORRILL, Justin Smith, American legislator and political leader, was born in Strafford, Vt., in 1810. He was elected to congress in 1854, was five times re-elected, was transferred to the senate in 1867, and retained his seat continuously until his death, having at that time served for a longer consecutive period than any other man. In 1857 he introduced a bill for the establishment, through the aid of public land grants, of state colleges for the purpose of teaching agriculture and the mechanic arts. This bill was vetoed by President Buchanan. In 1861 it was again introduced by Morrill, and this time became a law through the signature of President Lincoln. Morrill framed and introduced in the House the famous Morrill Tariff Act of 1861, which, with the enactments of 1862 and 1864, in the passage of which he also took a prominent part, modified the tariff system of the United States. He died in 1898.

MORRILL, Lot Myrick, American legislator and cabinet officer, was born at Belgrade, Maine, in 1813. In 1853 and 1854 he was elected to the lower house of the state legislature, and in 1856 was elected to the state senate. He was elected governor in 1857, and was re-elected in 1858 and 1859. In 1861 he was chosen United States senator and re-elected in 1863 and 1869. In 1876 he resigned to enter the cabinet of President Grant as secretary of the treasury. This portfolio he held until after the inauguration of President Hayes, when he became collector of customs at Portland, Maine. He died in 1883.

MORRIS, Clara, American actress and author, was born in Toronto, Can., in 1849. She was reared in Cleveland, Ohio, where at the Academy of Music she became a member of the ballet and leading actress. In 1872 she made a sensation in *L'Article 47*. Among her great successes are *Alix*, *Camille* and *Miss Multon*. Her best known works are *Little Jim Crow* and other stories for children, *My Personal Experiences* and *Recollections*, and *A Pasteboard Crown*.

MORRIS, George Pope, American journalist and poet, was born in Philadelphia in 1802. His drama *Briarcliff* (1825) was a popular success. He is best known by his poems: *Woodman, Spare That Tree*, *My Mother's Bible*, *We Were Boys Together*, and *A Long Time Ago*. He died in 1864.

MORRIS, Gouverneur, American statesman, was born at Morrisania, N. Y., in 1752. He was admitted to the bar in 1771. In 1775 he was chosen to represent Westchester county in the first Provincial Congress of New York. He served in two succeeding congresses in the same and the following year. In 1777, as assistant superintendent of finance, a position he held from 1781 to 1785, he drew up a scheme for a system of coinage that ultimately became the basis of our present system. He represented Pennsylvania in the constitutional convention of 1787 at Philadelphia. In 1790 he went to London as private agent to the British government to conduct negotiations regarding the unfilled stipulations of the treaty of 1783. In 1792 he was appointed minister to France. In 1800 he was elected from New York to the United States senate. He died in 1816.

MORRIS, Lewis, English poet, born near Caermarthen, Wales, 1834. His poems have been widely popular, many of them running through numerous editions; they include *Songs of Two Worlds*, *Epic of Hades*, *Gwen*, *Ode of Life*, *Songs Unsung*, *Gycia*, *Songs of Britain*, etc. His *Jubilee Ode* was recognized by a silver medal from her Majesty. He was knighted in 1895.

MORRIS, Robert, American financier and one of the signers of the Declaration of Independence, was born at Liverpool, England, in 1734. At the age of fourteen he was sent to America and by the outbreak of the revolutionary war had acquired a large fortune. In June, 1775, he became a member of the Pennsylvania committee of safety; in October of the same year he was elected to a seat in legislature of Pennsylvania (to which he was re-elected in 1776), and in November

he was appointed by that body a delegate to the Continental congress. At the expiration of his term in congress, in 1778, he was elected again to the state legislature. In October, 1780, he was returned to the legislature for the fourth time.

The fortunes of the colonial army at this time had reached their lowest ebb; Charleston had fallen; Gates was defeated; ammunition and supplies were wanted, the continental currency was worth little more than waste paper, together with Arnold's treachery, made



Rob Morris

the situation one of despair. Congress in this situation decided to supersede the old treasury board by a superintendent of finance. Morris was chosen to the position February 20, 1781. The means which enabled Washington and Greene to carry out the campaign of 1781 were raised by his exertions. In 1781, with the approval of congress, he founded the Bank of North America. He continued to hold the office of superintendent of finance until November, 1784, when he resigned. In 1786 he was again elected to the legislature, and in 1787 became a member of the constitutional convention at Philadelphia. He nominated Washington for the presidency of the convention. Upon the organization of the new government President Washington offered him the position of secretary of the treasury. He declined the offer. He, however, accepted a seat in the United States senate where he served until 1795. He died in 1806.

MORRIS, William, English poet, born in 1834. His poems include *The Life and Death of Jason*, 1867; *The Earthly Paradise*, 1868-70; *Love is Enough*, 1873; *Sigurd the Volsung*, 1877, etc. He translated various Scandinavian works, also Virgil's *Aeneid* and Homer's *Odyssey* into English verse, and published romantic tales, lectures on art, etc. He was a leader of the socialistic movement in Britain. He died in 1896.

MORRIS-DANCE, a dance supposed to have been derived from the Moriscos in Spain, formerly danced at puppet-shows, May-games, etc., in England. Bells were fastened to the feet of the performers, which jingled in time with the music, while the dancers clashed their staves or swords. In the reigns of Henry VII. and VIII. it was a principal feature in the popular festivals.

MORRISON, William Ralls, American politician was born in Monroe co., Illinois, in 1825. He took part in most of

the battles in Taylor's campaign in the Mexican war. From 1855 to 1859 he was a democratic member of the lower house of the Illinois legislature, serving as speaker in the last year. At the outbreak of the civil war he became colonel of the forty-ninth Illinois infantry. In 1863, he resigned to take his seat as a democrat in the thirty-eighth congress. From 1863-65 and from 1873-87 he was a member of the National House of Representatives. During his congressional career he attained wide distinction as an advocate of a radical reduction in the tariff. The bill of 1884, embodying the famous "horizontal" tariff scheme, proposed a straight (or horizontal) reduction of 20 per cent from the tariff of 1883. In 1885 Morrison was defeated for election to the United States senate by John A. Logan. He was appointed by President Cleveland a member of the Interstate Commerce Commission in 1887, and served until 1897, for the last six years as chairman.

MORRISTOWN, the capital of Morris co., N. J., on the Del. Lack. and West. Railroad; 30 miles W. of New York City. The city is in the great Morris county peach and rose belt, has an elevation of nearly 700 feet above sea-level. At Morris Plains, 4 miles from the city, is the New Jersey state lunatic asylum, the largest institution of its kind in the United States. Pop. 13,247.

MORSE, Samuel Finley Breese, inventor of the electro-magnet telegraph in its first practicable form; born at Charlestown, Mass., 1791; died at New York, 1872. He devoted special attention to chemistry and natural philosophy; but in 1811 went to England to study painting under West. In 1813 he was awarded a gold medal of the Royal



Samuel Morse.

Academy for his model of the Dying Hercules. Returning to the United States in 1815, he continued painting, and in 1826 succeeded in establishing the "National Academy of Design," of which he was first president. In 1839 he went to Europe for three years, and during the return voyage worked out roughly a plan for employing electro-magnetism in telegraphy. It was not until 1835, however, that he was able to exhibit an instrument that was found to work well. By July, 1837, this instrument was perfected, and ultimately in 1843 congress granted him means to construct an experimental line between Washington and Baltimore. From that time Morse's instrument came into general use in

America and Europe. In 1857 the representatives of ten countries met at Paris, and voted him 400,000 francs.

MORSE'S TELEGRAPH. See Telegraph.

MORTALITY, Law of, the statement of the average proportion of the number of persons who die in any assigned period of life or interval of age, out of a given number who enter upon the same interval, and consequently the proportion of those who survive. Tables showing how many out of a certain number of infants, or persons of a given age, will die successively in each year till the whole become extinct, are generally called tables of mortality. See Insurance.

MORTAR, a mixture of sand with slaked lime and water, used as a cement for uniting stones and bricks in walls. The proportions vary from 1½ part of sand and 1 part of lime to 4 or 5 parts sand and 1 of lime. When exposed to the action of the air this mixture absorbs carbon dioxide and "sets," forming a hard, compact mass. Hydraulic mortars which harden under water, and are used for piers, submerged walls, etc., are formed from so-called hydraulic lime, containing considerable portions of silica and alumina. See also Cement.

MORTAR is a kind of short cannon, of a large bore, with a chamber, used especially for throwing shells. The fire from mortars is what is termed vertical fire, the mortar being directed at a high angle and the shell striking the ground nearly vertically. The principal recommendations of vertical fire are, that the shells search behind cover and produce a great moral effect, also that at high elevations a great range is obtained with a comparatively small charge of powder.

MORTGAGE, in law, is the temporary pledging of realty in security of a debt, and as the realty can not be delivered into the creditor's hand, he acquires a hold over it by a deed called an indenture, or deed of mortgage. The ordinary form of a mortgage-deed resembles an absolute conveyance, but it contains a proviso that if the money borrowed is repaid within a certain time, then the mortgagee shall reconvey the realty to the mortgagor or borrower. Mortgage deeds must be recorded. A mortgagee can assign his mortgage security to another person, who thereupon stands in his shoes. The laws of each state in the Union have their own peculiarities as to mortgages, so that the legal status of the subject can only be obtained by consulting the various codes.

MORTIFICATION, in medicine, is the death of a part of the body while the rest continues alive, and often in a sound state. Mortification is a popular term, the scientific term being gangrene or necrosis, the former usually applied to the death of soft parts, the latter to the death of the bone. Mortification is generally induced by inflammation, by exposure to freezing cold, by hospital fevers, by languid, or impeded, or stopped circulation, as in cases of bed-ridden or palsied persons, and by improper food, particularly the spurred rye.

MORTON, Julius Sterling, American political leader, was born in Adams, Jef-

erson co., N. Y., in 1832, and was taken by his parents in 1834 to Michigan. In 1855 he removed to Nebraska, where he founded the City News, the first newspaper published in the state. In 1856-7 he was elected to the Nebraska territorial legislature, and in 1858 was appointed by President Buchanan secretary of the territory, and became acting governor a few months later. In 1893 he entered the cabinet of President Cleveland as secretary of agriculture. In 1901 he was appointed by President McKinley one of the United States commissioners for the Louisiana Purchase exposition. He was a student of forestry and was the originator of Arbor Day in Nebraska, the observance of which has extended to many other states. He died in 1902.

MORTON, Levi Parsons, American banker and vice-president of the United States, was born at Shoreham, Vt., in 1824. In 1863 he founded the banking-house of Levi P. Morton & Co., later Morton, Bliss & Co. In 1878 Morton was elected to congress. From the completion of his term until 1885 he was United States minister to France. In 1888 he was the successful candidate for vice-president on the republican ticket. From 1894 until 1896 he was governor of New York.

MORTON, Oliver Perry, American political leader, best known as the "War Governor" of Indiana; was born in Salisbury, Wayne co., Ind., in 1823. He entered politics as a democrat, but opposition to the Kansas-Nebraska bill led him to withdraw from that party, and ultimately he assisted in the formation of the republican party, to whose first national convention he was a delegate. In 1860 he was elected lieutenant-governor, and upon the governor's election as United States senator, Morton became governor, January 16, 1861. Upon the outbreak of the civil war he threw himself with extraordinary energy into the work of raising troops. He was re-elected governor in 1864. In 1867 he was elected United States senator, and was re-elected in 1873. At the republican national convention in 1876 he was a strong candidate for the presidential nomination, and received 124 votes on the first ballot. He subsequently served on the electoral commission. He died in 1877.

MORTON, William Thomas Green, American dentist, was born at Charlton, Mass., in 1819. In 1840 he began the study of dentistry at the Baltimore College of Dental Surgery. In 1844 Morton began with Dr. Jackson of Boston, the study of medicine. The art of dentistry was at that time in a transition stage, and Morton discovered many improvements, especially in attaching false teeth. In the course of his investigations he became acquainted with the value of sulphuric ether as a local anæsthetic. The new form of narcosis was christened "anæsthesia," and Morton obtained a patent for the use of ether. Jackson also claimed the honor of having made the discovery, and the Montyon prize of the French Academy was equally awarded to Dr. Morton and to Dr. Jackson, but Dr. Morton declined to accept it, which resulted in his receiv-

ing in 1852 the large gold medal, the Montyon prize in medicine and surgery. He died in 1868.

MOSAIC, a term applied to a kind of inlaid work formed by an assemblage of little pieces of enamel, glass, marble, precious stones, etc., of various colors, cut, and disposed on a ground of cement in such a manner as to form designs, and to imitate the colors and gradations of painting. This kind of work was used in ancient times both for pavements and wall decoration, while in modern times paintings are by this means copied, and the art is also used in pavements, jewelry, etc. The most remarkable modern works of this kind have been executed by Roman, Venetian, and Russian artists, those of the Roman school being the most celebrated, and consisting in particular of a series of portraits of the popes, and copies of notable paintings by the great artists, such as Raffaele, Domenichino, Guido, etc. For the production of these works rods of opaque colored glass are employed, an immense variety of colors and shades being used. Pieces are cut from the ends of these rods, according to the color required and are arranged side by side, their lower ends being attached by the cement while their upper ends show the design. From such works, when on a small scale, sections may be cut across, each section exhibiting the pattern.

MOSAIC GOLD, an alloy of copper and zinc, called also ormolu; also a sulphide of tin, the aurum musivum of the ancients.

MOSAIC WOOL-WORK, rugs, etc., made of variously-colored woolen threads, arranged so that the ends show a pattern. The threads are held firmly in a frame, so as to form a dense mass, with the upper ends of the threads presenting a close surface; this surface is smeared with a cement, and has a backing of canvas attached, after which a transverse section is cut the desired thickness of the pile, and so on with a number of similar sections.

MOSASAURUS, a gigantic extinct marine lizard occurring in the calcareous freestone which forms the most recent



Skull of Mosasaurus.

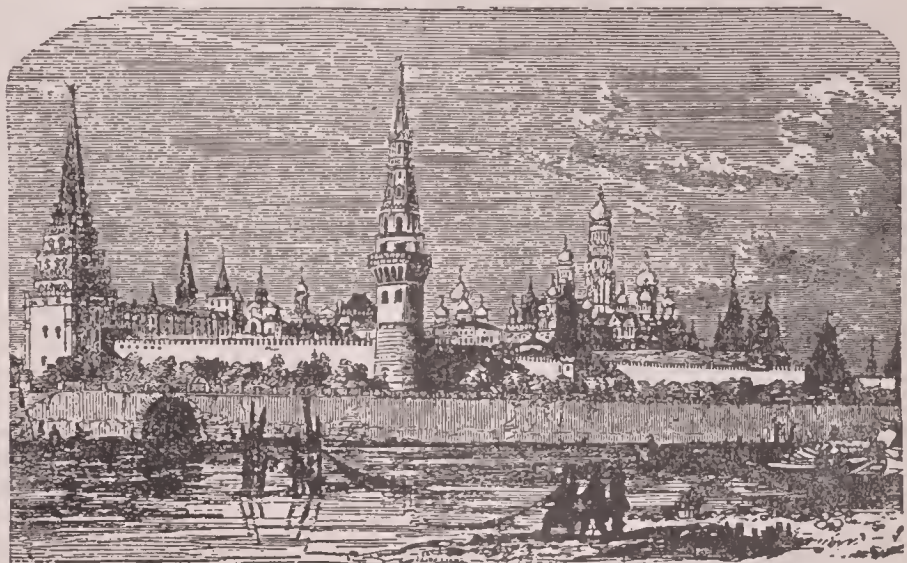
deposit of the Cretaceous formation. This reptile was about 25 feet long, and furnished with a tail of such construction as must have rendered it a powerful oar.

MOSBY (mōz'bī,) John Singleton, American soldier, was born at Edgemont, Powhatan co., Va., in 1833. After serving under Johnston in the Shenandoah Valley, in the winter of 1861-62, he was appointed an independent scout, and guided a bold raid in the rear of McClellan's army on the Chickahominy in June, 1862. In 1863 Mosby recruited an independent body of cavalry and began his remarkable career as a "par-

tisan" leader of an irregular force known as rangers, with which, until the close of hostilities, he operated in Virginia and Maryland. In August, 1864, he captured Sheridan's entire supply train, which he surprised near Berryville. In December, 1864, he was promoted to be colonel. After being disabled for a short time by a wound, he continued his operations until Lee's surrender, when he disbanded his troops, gave himself up, and by General Grant's intercession was paroled. From 1878 to 1885 he was United States consul at Hong Kong.

MOS/COW, the second capital (formerly the only capital) of the Russian Empire. It is the chief town of the government of the same name, and is situated in a highly-cultivated district on the Moskwa, 400 miles southeast of St. Petersburg, with which it is in direct communication by rail. It is surrounded by a wall or earthen rampart 26 miles

volumes, and is the most important of the Russian universities. Moscow is the first manufacturing city in the empire, and of late years its industrial and commercial activity has greatly increased. The principal manufactures are textile fabrics, chiefly woolen, cotton, and silk, besides hats, hardware, leather, chemical products, beer, and spirits. From its central position Moscow is the great entrepot for the internal commerce of the empire. The foundation of the city dates from 1147. It became the capital of Muscovy, and afterward of the whole Russian Empire; but was deprived of this honor in 1703, when St. Petersburg was founded. The principal event in the history of Moscow is the burning of it in 1812 for the purpose of dislodging the French from their winter quarters. Pop. (1897), 1,035,664.—The government forms an undulating tract of about 13,000 sq. miles, and the soil is mostly



Moscow—general view of the Kremlin.

in circuit and of no defensive value; and a considerable portion of the inclosed space is unoccupied by buildings. The quarter known as the Kreml or Kremlin, on a height about 100 feet above the river, forms the center of the town, and contains the principal buildings. It is inclosed by a high stone wall, and contains the old palace of the czars and several other palaces; the cathedral of the Assumption, founded in 1326, rebuilt in 1472; the church of the Annunciation, in which the emperors are recrowned; the cathedral of St. Michael; the Palace of Arms, an immense building occupied by the senate, the treasury, and the arsenal; and the Tower of Ivan Veliki (209 feet), surmounted by a gilded dome, and having at its foot the great Czar Kolokol, or king of bells, 60 feet round the rim, 19 feet high, and weighing upward of 192 tons, the largest in the world. Outside the Kreml the chief building is the cathedral of St. Vassili, with no less than twenty gilded and painted domes and towers, all of different shapes and sizes. Among the principal educational establishments are the Imperial University, founded in 1755 by the Empress Catharine. It has a rich museum and a library of 200,000

productive, the forests occupying about 39 per cent. Pop. 2,433,356.

MOSES, leader, prophet, and legislator of the Israelites, was born in Egypt about 1600 B.C., during the time of the oppression of the Hebrews. His father, Amram, and mother, Jochebed, both of the race of Levi, were obliged to expose him in obedience to a royal edict, but placed him in a basket of bulrushes on the river border, where he was found by the daughter of the Egyptian king as she went to bathe. She adopted him as her son, and in all probability had him educated for the duties of the priesthood, the means of instruction thus afforded him being the best which his time possessed. His expedition into Ethiopia, in his fortieth year, as leader of the Egyptians, when he subdued the city of Saba (Meroe), won the affections of the conquered Princess Tharbis, and married her, rests only on the tradition preserved by Josephus. An outrage committed by an Egyptian on a Hebrew excited his anger, and he secretly slew the Egyptian. The deed became known, and he escaped the vengeance of the king only by a hasty flight into Arabia. Here he took refuge with Jethro, a Midianitish prince and a priest, and

espoused his daughter Zipporah. The promises of God that his race would become a great nation occupied much of his thoughts, and at last God appointed him the chosen deliverer from the bondage of Egypt. Being slow of speech, and possessing none of the arts of an orator, God therefore gave him power to prove his mission by miracles, and joined to him his elder brother Aaron, a man of little energy, but of considerable eloquence. Thus prepared, Moses returned to Egypt at the age of eighty years to undertake the work. At first he had the greatest obstacles to overcome, but after the visitation of ten destructive plagues upon the land, Pharaoh suffered the Hebrews to depart. Moses conveyed them safely through the Red Sea, in which Pharaoh, who pursued them, was drowned with his army. New difficulties arose, however. The distress of the people in the desert, the conflicts with hostile races, the jealousies of the elders, often endangered his authority and even his life, despite the miraculous attestations of his mission. During the term of the encampment at Sinai he received the Ten Commandments and the laws for the regulation of the lives of the Israelites. When they were already near the end of their journey toward Canaan Moses saw himself compelled, in consequence of new evidences of discontent, to lead them back into the desert, for forty years more of toilsome wandering. He was not himself permitted, however, to see the Israelites settled in their new country on account of a murmur which, in the midst of his distresses, he allowed to escape against his God. After appointing Joshua to be the leader of the Hebrews he ascended a mountain beyond Jordan, from which

medan places of worship we find neither altars, paintings, nor images, but a great quantity of lamps of various kinds, arabesques which form the principal interior ornament, and sentences from the Koran written on the walls. Every mosque has its minaret or minarets. The buildings are often quadrangular in plan, with an open interior court, where are fountains for ablutions. The floor is generally covered with carpets, but there are no seats. In the direction toward Mecca is the mihrab, a recess in the wall to direct the worshippers where to turn their eyes in prayer, and near this is the mimbar or pulpit. The buildings may embrace accommodation for educational purposes, etc., besides the temple proper.

MOSQUITO (mos-kē'tō), a general name for such insects of the gnat family as inflict a severe bite and make themselves a pest to people residing in warm climates, or during the warm season in many arctic regions.

MOSQUITO TERRITORY, a region of Central America, lying on the Caribbean Sea, and forming the eastern seaboard of Nicaragua. For a considerable period it was governed by a native chief, and was under British protection, but in 1860 it was made over to the state of Nicaragua. The capital is called Bluefields.

MOSS-AGATE. See Mocha-stone.

MOSESSES, a group of cryptogamic or flowerless plants of considerable extent, and of great interest on account of their very singular structure. They are in all cases of small size, seldom reaching a foot in height, but having a distinct axis of vegetation, or stem covered with leaves; and are propagated by means of reproductive apparatus of a peculiar nature. They are formed entirely of

which and the walls of the theca is filled with minute sporules. Mosses are found in cool, airy, and moist situations, in woods, upon the trunks of trees, on old walls, on the roofs of houses, etc. The genera of mosses, which are numerous, are principally characterized by peculiarities in the peristome, or by modifications of the calyptra, and of the position of the urn, or hollow in which the spores are lodged.

MOTH, the popular name of a numerous and beautiful division of lepidopter-



Caterpillar, chrysalis, and butterfly, male and female, of the gypsy moth.

ous insects, readily distinguished from butterflies by their antennæ tapering to a point instead of terminating in a knob, by their wings being horizontal when resting, and by their being seldom seen on the wing except in the evening or at night (though some moths fly by day); hence the term crepuscular and nocturnal lepidoptera applied to them. Among



Tiger moth.

the more notable of the moths are the "feather" or "plume-moths," the "death's-head moth," the "clothes-moths," and the "silk-moth."

MOTHER CAREY'S CHICKEN, the sailors' name for the stormy petrel. See Petrel.

MOTHER-OF-PEARL, or **NACRE**, the hard silvery brilliant internal or nacreous layer of several kinds of shells, particularly of the oyster family, often variegated with changing purple and azure colors. It is destitute of coloring matter, but is composed of a series of minute and slightly imbricated layers or ridges which have the power of decomposing the rays of light, thus producing beautiful iridescent hues. The large oysters of the tropical seas alone secrete this coat of sufficient thickness to render their shells available for the purposes of manufacture. Mother-of-pearl is extensively used in the arts, particularly in inlaid work, and in the manufacture of handles for knives, buttons, toys, snuff-boxes, etc.

MOTION, in physical science, is the passing of a given body from one place



Court of the mosque of Tooloon, Cairo.

he surveyed the land of promise, and so ended his life in his 120th year.

MOSLEM, a general appellation in European languages for all who profess Mohammedanism.

MOSQUE, a Mohammedan church or house of prayer. These buildings are constructed in the Saracenic style of architecture, and often astonish by their extent and the grandeur and height of their cupolas or domes. In these Moham-

cellular tissue, which in the stem is lengthened into tubes. Their reproductive organs are of two kinds—axillar cylindrical or fusiform bodies, containing minute roundish particles; and thecae or capsules, supported upon a stalk or seta, covered with a calyptra, closed by an operculum or lid, within which is a peristome composed of slender processes named teeth, and having a central axis or columella, the space between

to another. We have no idea of absolute position in space, so that when we speak of the motion of a point it is only in relation to some point regarded as fixed. Thus our conception of the movement of the earth is derived from its relation in position to the sun and stars. Bodies move in various directions, their motion being described as rectilinear when they move in a straight line, curvilinear when they move in a curve, vibratory when they move to and fro in relation to a fixed point, rotatory when they turn on an axis, and circular when they sweep round a given point. For Newton's laws of motion see Dynamics.

MOTLEY, John Lothrop, historian and diplomatist, born in Massachusetts 1814, died 1877. He published, after ten years' labor and a journey to Europe his great History of the Rise of the Dutch Republic in 1856, a work which was further developed in the History of the United Netherlands (1860-65); and the Life and Death of John Barneveld (1874). He was ambassador from the United States to Vienna in 1861-67, and to London in 1869-70.

MOTOR NERVES. See Nerve.

MOTT, Lucretia (Coffin), American abolitionist and woman's rights advocate, was born on Nantucket Island in 1793. As a result of a visit to Virginia she became an ardent advocate of emancipation. In 1833 she attended the first convention of the American Anti-Slavery Society. Soon afterward she helped to organize the Female Anti-Slavery Society. In 1840, in London, the question of the equal participation of women in the proceedings of the Anti-Slavery Convention came up, and all women were excluded. It was then that Lucretia Mott and Elizabeth Cady Stanton first discussed the woman's rights movement, which they launched eight years later at a convention in Seneca Falls, N. Y. She died in 1880.

MOUKDEN. See Mukden.

MOULDINGS, in architecture a general term applied to the varieties of outline or contour given to the surfaces or edges of various subordinate parts or features of buildings, whether projections or cavities, such as cornices, bases, door or window jams, lintels, etc.

MOULMEIN (moul-min'), or **MAULMAIN**, a seaport of Burmah, division of Tenasserim, at the mouth of the river Salween. It has a good harbor, and a considerable trade chiefly in teak, cotton, rice, tobacco, stick-lac, lead, copper, cocoa-nuts, hides and live stock. Pop. 58,446.

MOULT, the process of shedding or casting feathers, hair, skin, horns, etc. The word is most commonly used with regard to birds; but other animals, such as crabs and lobsters, which shed their entire shells, frogs and serpents, which cast their skins, are also said to moult.

MOUND BUILDERS, the name given to the people who at one time lived in the artificial hillocks or mounds which existed in the valleys of the Mississippi, the Ohio, the Missouri and their tributaries, also in Michigan, Wisconsin, Pennsylvania, Iowa, Nebraska, Kentucky, Louisiana, and Arkansas, and the Red River valleys, and in certain parts of North Carolina and Indiana.

The new state of Washington is dotted over with these mounds, having an arrangement like that on a five-spot playing card. The mounds are artificial hillocks of earth or sand—sometimes round, oval, square, and in some cases polygonal or triangular, varying in height from a few inches to 100 feet, and in diameter from 100 to 300 yards. The most important mound still in existence is that of Cahokia in Illinois. This mound



risers in the midst of about 60 others in four successive terraces, reaching an elevation of 91 feet. It covers a surface of 12 acres, being almost equal to the great pyramid of Cheops. The mound-builders' are now regarded merely as the ancestors and representatives of the tribes found in the same region by Spanish, French, and English pioneers. The chief contents of the mounds are skeletons, with ceremonial and other objects buried with the bodies, while the structures are wholly of earth; in a few cases house-like structures form the nucleus of the mound.

MOUNTAIN, a mass of earth and rock rising above the surface of the globe higher than a hill. Mountains are usually found in groups, systems, ranges, or chains, though isolated mountains, due to volcanic action, are also found. The elevation of great mountain masses is due to gigantic subterranean movements long continued; but mountains of considerable mass have also been carved out by surface denudation. The highest mountain in the world is Mount Everest, one of the Himalayan range, which is 29,002 feet above the level of the sea.

MOUNTAIN LION, the name in the western part of the United States for the panther, cougar, or puma. Early writers upon America reported that the lion was a resident of North America from the skins they saw among the Indians, which they supposed to be those of lionesses. See Puma.

MOUNTAIN MEADOWS MASSACRE, the massacre near Mountain Meadows in Utah in 1857, of a party of emigrants passing through Utah on their way to Southern California. They numbered about 140 men, women, and children.

Stopping to rest their horses, they were fired upon by Indians, and, it is alleged, by Mormons disguised. They withstood siege until September 11th, when, on promise of protection by John D. Lee, Mormon bishop and Indian agent, they left the shelter of their wagons. All adults and children over seven years of age were killed, and seventeen younger children were distributed among Mormon families, but were afterward restored to relatives by the United States government. Lee was executed for this crime in 1877.

MOUNT CARMEL, a town in Northumberland co., Pa.; on the Lehigh Val., the N. Cent., and the Phila. and Read. railways; 28 miles e. by s. of Sunbury, the county seat. It has a number of anthracite coal mines. Pop. 14,689.

MOUNT CLEMENS, the capital of Macomb co., Mich., on the Clinton river at the head of navigation, and on the Grand Trunk railway; 22 miles n.e. of Detroit. It is noted for its mineral and magnetic waters, said to have remarkable curative properties, which make the city a resort for thousands of invalids annually. Pop. 8,160.

MOUNT VERNON, a city in Westchester co., N. Y.; on the Bronx river, and the N. Y., N. H. and H. and the N. Y. C. and H. R. railways; 13 miles n. of New York. Pop. 21,975.

MOURNING, as the outward expression of grief, has greatly varied at different times and among different nations. Thus the eastern nations and the Greeks cut off their hair, while the Romans allowed the beard and hair to grow; and as an evidence of mourning the ancient Egyptians wore yellow; the Ethiopians, gray; the Roman and Spartan women, white, which is still the color of grief in China, Japan and Siam; in Turkey, blue and violet; and in the other European countries black is used for this purpose. The Jews, in sign of grief at the loss of their relatives, rent their garments, tore out their hair, and wore coarse garments of a dark color; and with the Greeks and Romans it was the custom to lay aside all ornaments of dress, to abstain from the bath, and other indulgences.

MOUSE, the name of a number of rodents of which the most familiar is the domestic mouse. The harvest-mouse, is a hibernating mammal, and constructs a little nest of grass, etc., entwined round



Mouse.

and supported by the stalks of the corn or wheat. The common field-mouse is a dusky brown, with a darker strip along the middle of the back, while the tail is of a white color beneath. There are about a hundred members of the mouse genus, of which the common rat is one. The dormouse is of a different family from the true mice.

MOUTH, the aperture in the head of an animal through which food is received and voice uttered; or generally the anterior opening of the alimentary canal. In the higher animals the use of the mouth is for mastication, the emission of sound or voice, deglutition, and taste. In many animals of a low type of structure there is no distinct mouth. Thus in the simpler Protozoa the food is taken into the interior of the body by a process of intussusception, any portion of the surface being chosen for this purpose, and acting as an extemporaneous mouth, which closes up again when the particle of food has been received into the body.

MOZAMBIQUE (mo-zam-bēk'), a Portuguese government on the east coast of South Africa, extending from Cape Delgado to Delagoa Bay, and inland to British territory (Rhodesia, Transvaal, etc.); estimated area, 380,000 sq. miles; only a small part of which is occupied. Pop. 8522.

MOZART (mo-zart'; German pron. mō'tsärt), Johann Chrysostomus Wolfgang Amadeus, a great German composer, born at Salzburg 1756, died at Vienna 1791. At the age of four years his father, Leopold Mozart, a violinist of repute, began to teach him some minuets and other small pieces on the harpsichord. From this period he made rapid progress, and a concerto for the harpsichord, which he wrote in his fifth year, was so difficult that only the most practiced performer could play it. In his sixth year Mozart was taken by his father, along with his sister, to Munich and Vienna, where the little artists were received at court with great favor. In 1763 the family made a journey to Paris, where Mozart published his first sonatas for the harpsichord; and in the following year they proceeded to England, where the child-musician performed before the court the most difficult compositions of Bach and Handel. In 1769 Mozart, who had been made master of the concerts at the court orchestra at Salzburg, commenced a journey to Italy in company with his father. In Rome he wrote down, on hearing it, the famous Miserere, annually sung in the Sistine Chapel during the holy week. At Milan in 1770 he composed, in his fourteenth year, his first opera, *Mithridates*, which was performed more than twenty times in succession. Henceforth he resided chiefly in Salzburg, but also visited Paris, Munich, and finally Vienna. In the latter city, although he was appointed composer to the court, he found it necessary to maintain himself by giving lessons in music and writing waltzes. Notwithstanding this poverty it was here that most of his best work, such as his famous operas, *The Marriage of Figaro*, *Clemency of Titus*, *The Magic Flute*, and his last work, the *Requiem*, were written. It was here also that the best pianist and greatest composer of his time—perhaps of the world—died in obscurity and was buried in a pauper's grave. The extent of work done by Mozart during his short life is almost incredible, and in every department of composition, whether vocal or instrumental, he excelled. In the history of music he stands most prominent-

ly forward as an operatic composer, his *Don Giovanni*, *Magic Flute*, and *Marriage of Figaro* being works previously unequalled and never since surpassed.

MUCILAGE, a solution of some gummy substance in water, giving it a certain consistence; in chemistry, one of the proximate elements of vegetables, a carbohydrate. It is contained abundantly in gum tragacanth, many seeds, as linseed, quince seed, etc., and certain roots, as marsh-mallow. It forms a thick jelly with water, and when boiled with dilute sulphuric acid gives rise to a sugar and a gum.

MUCUS, a viscid fluid secreted by the mucous membrane of animals, which it serves to moisten and defend. It covers the lining membranes of all the cavities which open externally, such as those of the mouth, nose, lungs, intestinal canal, urinary passages, etc. It is transparent, glutinous, thready, and of a saline taste; it contains a great deal of water, chloride of potassium and sodium, lactate of sodium and of calcium; and phosphate of calcium. Mucus forms a layer of greater or less thickness on the surface of the mucous membranes, and it is renewed with more or less rapidity. Besides keeping these membranes in a moist and flexible condition, it also protects them against the action of the air, of the aliment, the different glandular fluids, and agencies that might otherwise irritate and inflame.

MUD, in geology, a mixture of clay and sand with organic matter. Mud may be argillaceous, calcareous, or otherwise, according to the most notable ingredient which enters into its composition.

MUD-BATH, a kind of bath connected with some mineral springs, consisting of mud transfused with saline or other ingredients, in which patients suffering from rheumatism, etc., plunge the whole or portions of the body.

MUEZ'ZIN, or **MUED'DIN**, a Mohammedan crier attached to a mosque, whose duty it is to proclaim the ezam or summons to prayer five times a day—at dawn, at noon, 4 p.m., sunset, and night fall. He makes his proclamation from the balcony of a minaret; and as this elevated position enables a person to see a good many of the private proceedings of the inmates of the neighboring houses, the post of muezzin is often intrusted to a blind man.

MUFTI, in the Turkish Empire, a religious officer who exercises the functions of an authoritative judge in matters of religion. The muftis are chosen from among the ulemas or doctors of the law, and the grand mufti or Sheikh-ul-Islam is the highest officer of the church and the representative of the sultan in spiritual matters.

MUGWORT, a popular name for various species of *artemisia*.

MUGWUMP, a term originally applied to a voter identified with a particular party, but claiming the right to vote with another party. Its popular use began with an article in the *New York Sun* for March 23, 1884, and was in the same year applied to the independent republicans, who refused to support James G. Blaine for the presidency. The name was applied to them in derision, but was accepted by them, and now regularly de-

notes any body of voters who profess to be independent of strict party obligations.

MUHLHAUSEN (mül'hou-zn), a town of Prussian Saxony, on the Unstrut, 29 miles northwest of Erfurt. It has two interesting churches, an old town-house, a gymnasium, and manufactures of woolen and cotton cloth, leather, sewing-machines, etc. It was formerly a free city of the empire. Pop. 33,433.

MUHLHAUSEN, or **MULHAUSEN**, a town of Germany, situated on the Ill, in Alsace-Lorraine, 61 miles s.s.w. of Strasbourg. Pop. 89,012.

MUKDEN (muk'den), **MOUKDEN**, a town of China, capital of Manchuria and of the province of Leao-Tong, about 380 miles n.e. of Peking. Pop. about 250,000.

MULATTO, a person that is the offspring of parents of whom one is white and the other a negro. The mulatto is of a dark color tinged with yellow, with frizzled or woolly hair, and resembles the European more than the African.

MULBERRY, the black or common mulberry is the only species worthy of being cultivated as a fruit-tree. The fruit is used at dessert, and also preserved in the form of a syrup. The juice of the berries mixed with that of apples forms a beverage of a deep port-wine color, called mulberry cider. The white mulberry is the most interesting of the



Black mulberry.

genus, on account of its leaves being used for food by silkworms. It grows to the height of 40 or 50 feet, with a trunk 2 or more feet in diameter. The red mulberry has fruit of a deep-red color, and is a valuable American tree. The paper mulberry is a distinct genus, belonging originally to Japan, its bark is used in making paper, and its wood is highly valued for ornamental work.

MULE, the name applied to any animal produced by a mixture of different species, but specifically denoting the hybrid generated between an ass and a mare. The head of the mule is long and thin, its tail is bushy, and its mane short. It unites the speed of the horse with the dogged perseverance of the ass, and is docile in temper when fairly treated.

MULE, a spinning-machine invented by Samuel Crompton in 1775, and so called from being a combination of the drawing-rollers of Arkwright and the jenny of Hargreaves. In this machine the rovings are delivered from a series of sets of drawing-rollers to spindles placed on a carriage, which travels away from the rollers while the thread is being twisted, and returns toward the rollers while the thread is being wound.

MULLER (mül'ér), Friedrich Max, a celebrated philologist, was born at Dessau

in 1823; published (1844) the *Hitopadesa*, a collection of Sanskrit fables; proceeded then to Berlin, where he attended the lectures of Bopp and Schelling; continued his studies under Burnouf in Paris; came to England in 1846, and established himself at Oxford, where he was appointed successively Taylorian professor of modern languages (1854), assistant, and ultimately sub-librarian at the Bodleian library (1865), and professor of comparative philology (1868), a position which he practically resigned in 1875, but nominally held till his death in 1900. He was a member of the French Institute, and an LL.D. of Cambridge and Edinburgh. His numerous writings include an edition of the *Rig-Veda*, *History of Sanskrit Literature*, *Lectures on the Science of Language*, *Chips from a German Workshop*, *On the Origin and Growth of Religion*, *Selected Essays*, *The Science of Thought*, *Biographies of Words*, *Natural Religion*, and he was the editor of the series of *Sacred Books of the East* undertaken by the university.

MUL'HALL, Michael George, distinguished statistician, born in Dublin, Ireland, in 1836. In 1884 he was elected to the British Association for the advancement of science. His works include a *Handbook of the River Plata*; *Rio Grande do Sul and Its German Colonies*; *The English in South America*. In 1880 Mulhall brought out his *Progress of the World in Arts, Agriculture, Commerce, Manufacture, Instruction, Railways, and Public Wealth*, since the beginning of the nineteenth century. This was followed by other highly valued works on statistics: *History of Prices*; *Industries and Wealth of Nations*; and a *Dictionary of Statistics*. He died in 1900.

MULLET, a name common to two groups of fishes, viz. the gray mullets and the red mullets. Naturalists, however, generally restrict the name to the former, designating the red mullets as sur-mullets. Of the true mullets the best-known is the common gray mullet found round the shores of the British islands, and in particular abundance in the Mediterranean. It grows to the length of 18 to 20 inches, and will sometimes weigh from 12 to 15 lbs. It has the habit of rooting in mud or sand in search of food. Another species also called gray mullet a native of the Mediterranean, is distinguished by having its eyes half covered by an adipose membrane. It weighs usually from 10 to 12 lbs., and is the most delicate of all the mullets. A smaller species, the thick-lipped gray mullet, is common on the British coasts. Many other species, natives of India and Africa, are much esteemed as food.

MULOCK, Dinah Maria. See Craik.
MULTAN', or **MOOLTAN'**, a city of India, in the Punjab, the chief city and capital of a district of same name. It is one of the most ancient cities in India, and is the center of a large trade. Pop. 87,394.—The district has an area of 6079 sq. miles; pop. 710,548.

MULTIPLE, in arithmetic a number which contains another an exact number of times without a remainder; as 12 is a multiple of 3, the latter being a submultiple or aliquot part. A common multiple of two or more numbers contains each of them a certain number of times exactly;

thus 24 is a common multiple of 3 and 4. The least common multiple is the smallest number that will do this; thus 12 is the least common multiple of 3 and 4. The same term is applicable to algebraic quantities.

MUMMIES, dead human bodies embalmed and dried after the manner of those taken from Egyptian tombs. An immense number of mummies have been found in Egypt, consisting not only of human bodies, but of various animals, as bulls, apes, ibises, crocodiles, fish, etc. The processes for the preservation of the body were very various. Those of the poorer classes were merely dried by salt or natron, and wrapped up in coarse cloths and deposited in the catacombs. The bodies of the rich and the great underwent the most complicated operations, and were laboriously adorned with all kinds of ornaments. Embalmers



Mummy of Penamen, priest of Amun Ra—
British museum.

of different ranks and duties extracted the brain through the nostrils, and the entrails through an incision in the side; the body was then shaved, washed, and salted, and after a certain period the process of embalming, properly speaking, began. The whole body was then steeped in balsam and wrapped up in linen bandages; each finger and toe was separately enveloped, or sometimes sheathed in a gold case, and the nails were often gilded. The bandages were then folded round each of the limbs, and finally round the whole body, to the number of fifteen to twenty thicknesses. The head was the object of particular attention; it was sometimes enveloped in several folds of fine muslin; the first was glued to the skin, and the others to the first; the whole was then coated with a fine plaster. The Persians, Assyrians, Hebrews, and Romans had all processes of embalming, though not so lasting as that of Egypt. The art also was practiced by the Guanches of the Canaries, the Mexicans, Peruvians, etc. Natural mummies are frequently found preserved by the dryness of the air.

MUMPS, a disease consisting in a peculiar and specific unsuppurative inflammation of the salivary glands, accompanied by swelling along the neck, extending from beneath the ear to the chin. Children are more subject to it than adults.

MUNCHHAUSEN (mũnh'hou-zn), Karl Friedrich Hieronymus, Baron von, a German officer, born in Hanover in 1720, died 1797. He served several campaigns against the Turks in the Russian service 1737-39. Baron Munchhausen's *Narrative*, a small book of 48 pages, appeared in London in 1785. Two years after it was translated into German by Bürger, who naturally passed in Germany for the writer. The real author was Rudolf Erich Raspe (1737-94), a native of Hanover who took refuge in England from a charge of theft. The book was afterward enlarged by additional stories, many of them very old.

MUNCIE, the capital of Delaware co., Ind., on the White river, and the Lake Erie and W., the Cleve., Cin., Chi. and St. L., and the Ft. W., Cin. and Louis. railways; 54 miles e. of Indianapolis, 110 miles n. w. of Cincinnati. It is in the center of the great Indiana natural-gas belt, which gives the factories free fuel. Pop. 22,132.

MUN'GOOSE, a species of ichneumon, otherwise known as the "gray" or "Indian" ichneumon. Being easily domesticated it is kept in many houses in Hindustan to rid them of reptiles and other vermin, as rats, mice, etc. It has been said that it neutralizes the poison of snakes, which it fearlessly attacks, by eating, during its contests with them, snake-root; but its immunity is really due to the extreme celerity of its movements. It is of a gray color flecked with black, and about the size of a rat.

MUNICH (mũ'nik), the capital city of Bavaria. It lies on an extensive but uninteresting plateau, about 1700 feet above sea-level, chiefly on the left bank of the Isar. Munich is one of the finest towns in Germany. Vast improvements are due to the munificence of King Ludwig I. The royal palace forms a very extensive series of buildings chiefly in the Italian style, and contains many magnificent apartments and rich artistic and other treasures. Connected with it are the court church and the court and national theater, among the largest in Germany. The city is highly celebrated for its fine galleries of sculpture and painting, and for various other important collections, such as that of the Bavarian national museum. The royal library has upward of 1,000,000 volumes and 30,000 MSS., being thus one of the largest in Europe. The university is attended by some 3500 students, and has a library of 300,000 vols. There is an academy of science, an academy of arts, and many fine churches, including the cathedral, founded in 1488. Munich is the seat of the high courts of legislature and of law, and of all the more important offices of the state. It was founded by Henry, duke of Saxony, in 962; taken by Gustavus Adolphus in 1632, by the French under Moreau in 1800, and by Napoleon in October, 1805. Pop. 499,959.

MUNICIPALITY, a town or city possessed of certain privileges of local self-government, derived from incorporating charters granted by the state. Or the term may be applied to the corporation or body of persons in a town having the powers of managing its affairs.

MUNICIPAL OWNERSHIP, properly speaking the possession by a city or town of any property is municipal ownership; but the term is generally applied to public ownership and operation of public utilities, such as water works, gas and electric light plants. In England this is called municipal trading. Municipal ownership has become an issue in America during the last decade, advocacy or opposition to it being based largely upon the utility considered, with almost the unanimous agreement that services of a sanitary character, such as water works and sewerage, should be under municipal control. There is some divergence of opinion, however, as to

municipal lighting, and less than twenty-five gas works in the United States are operated by municipalities, while only one-sixth of the electric light plants are municipal, the largest of these being in Detroit and Chicago, and which are used only for lighting streets and public buildings. In Europe, private ownership of electric lighting plants is customary outside of the United Kingdom, in which the majority are municipal. The gas works in Germany and Great Britain are nearly evenly divided between municipal and private plants, with the tendency increasing toward the former.

All but eight of the thirty-eight cities of over 100,000 population in America own their water works, but of the water works in the United States nearly one-half are private works, most of these being in the smaller towns which have been unwilling to compete with private enterprise. Private companies supply the sewerage for all but six places where the population is 3,000 or over.

The theory on which the argument for municipal ownership is based is that undertakings which require the use of the streets or other public places, are natural monopolies, and that all natural monopolies should be vested in the city rather than in the private corporation, as their use is compulsory upon citizens. The advocates say there is greater need for public lighting in the large cities than there is for public water supply in some localities.

The arguments for municipal ownership of street railways is generally based upon the additional theory that means of transportation should belong to the city just as much as should the sidewalks upon which people travel. Even when there has been a public sentiment in favor of municipal operation of street railways, there has been an objection raised on the ground that the amount of money involved affords unusual opportunity for graft and also failing effective civil service reform employees would be used as a part of the political machine. These arguments have been the principal ones used in cities like Chicago, where the subject of municipal operation of street railways has been most agitated. Great Britain contains almost all the municipal street railway systems in the world, there being about forty in that country, the most notable being those in Manchester, Glasgow, and Sheffield. In other cities and in several places in Canada street railways are owned by the city and leased to operating companies.

One-eighth of the ferries in the United States are municipal, the Boston system being the most elaborate. Several cities own their docks, including New York, which receives a large income therefrom. There are municipal markets throughout the world, 150 being in the larger cities of the United States, the largest of which are those in New York, New Orleans, Boston, and Baltimore.

Under municipal ownership there is much difference of opinion as to whether revenue should be sacrificed to cheapness and efficiency of service. Varying policies in these respects are in force, the advocates of municipal ownership usually believing that cheapness is the prime

requisite, while the opponents declare this of itself is an argument against the system, asserting it results in an increase of the general tax rate and a consequent shifting of the expense upon the large property holders.

MUNKACSY (mün'käch-i), Mihaly, real name Michael Lieb, Hungarian genre and historical painter, born at Munkacs 1846; studied at Gyula, Vienna, Munich, and Düsseldorf, and settled in Paris in 1872. Among his best-known pictures are *Last Day of a Condemned Man*, *Milton dictating Paradise Lost*, *Christ before Pilate*, *Last Moments of Mozart*. He died in 1900.

MUNN, Orson Desaix, American lawyer and journalist, was born in Monson, Hampden co., Mass. In 1824 he bought with Alfred E. Beach the *Scientific American*; founded the *Scientific American Supplement* in 1876 and the *Architects' and Builders' Edition* in 1885.

MUNNICH, Burkhard Christoph Count, Russian statesman and general was born in 1683, and who, through brilliant military service, was made chief minister and became the most powerful man in Russia. Afterward falling from favor, he was exiled to Siberia for twenty years. His estates were finally restored to him and he was made director-general of the Baltic ports. He died in 1767.

MUNROE, Kirk, American journalist and author, was born in Appleton, Wis., in 1856. Wrote many books for boys. First editor of *Harper's Young People*. His works include: *The Flamingo Feather*, *Under the Great Bear*, *Dory Mates*, and *The Belt of the Seven Totems*.

MUNSEY, Frank Andrew, American publisher, was born in Albany, N. Y., in 1854. Established the *Golden Argosy*, afterward changed to *The Argosy*. Founded *Munsey's Weekly*, which was changed to *Munsey's Magazine*, *The Puritan*, and *The Scrapbook*. Controlled *Washington Times*, the *New York Daily News*, and the *Boston Journal*.

MUNSON, James Eugene, American inventor and author, was born in Paris, Oneida co., N. Y., in 1835. Originated the Munson system of stenography, an automatic typesetting machine, and a mechanism for operating typewriting machines by telegraph.

MUNSTER, the southwest province of Ireland comprising the six counties of Clare, Cork, Kerry, Limerick, Tipperary, and Waterford. Area, 9475 sq. miles. Pop. 1,076,188.

MUNSTER (mün'stér), a town of Prussia, capital of the province of Westphalia. The principal edifices are the cathedral, the church of St. Lambert, the townhouse, the exchange, museum, theater, etc. The manufactures include woolen, linen, and cotton goods, etc. Pop. 68,562.

MUNSTER, Peace of. See *Westphalia, Peace of*.

MURAL CIRCLE, an astronomical instrument consisting of a telescope attached to a vertical brass circle which turns upon an axis passing through a stone pier. The brass circle revolves exactly in the plane of the meridian, and is carefully divided into degrees and minutes. Attached to the stone pier, and at equal distances apart are six microscopes for the purpose of viewing the

graduated circle and determining exactly its position and consequently that of the telescope. It is regarded as the principal fixed instrument in all the great public observatories. Its chief use is to measure angular distances in the meridian, and so to determine the declination of a star, or its distance from the celestial equator. The right ascension of a star being given by the transit instrument, and its declination by this, its exact position is determined.

MURAT (mü-rä), Joachim, French marshal, and for some time King of Italy born in 1771, died 1815. He served in the constitutional guard of Louis XVI.; then entered the 12th Regiment of mounted chasseurs; rose by his zealous Jacobinism to the rank of lieutenant-colonel; was afterward removed as a terrorist, and remained without employment till his fate placed him in connection with Bonaparte, whom he followed to Italy and Egypt, becoming general of division in 1799. In 1800 he married Caroline, the youngest sister of Bonaparte. He was present at the Battle of Marengo, and in 1804 was made marshal of the empire, grand-admiral, and prince of the imperial house. His services in the campaign of 1805 against Austria, in which he entered Vienna at the head of the army, were rewarded in 1806 with the grand-duchy of Cleves and Berg. In the war of 1806 with Prussia, and of 1807 with Russia, he commanded the cavalry, and in 1808 he commanded the French army which occupied Madrid. He anticipated receiving the crown of Spain, Charles IV. having invested him with royal authority; but Napoleon, who destined Spain for his brother Joseph, placed him on the throne of Naples, July 15, 1808. He then took the title of Joachim Napoleon. He shared the reverses of the Russian campaign of 1812, and in 1813 again fought for Napoleon, whose cause he deserted after the battle of Leipzig. He took up arms again in 1815 for Napoleon; but being defeated by Generals Neipperg and Bianchi near Tolentino, 2d and 3d May, he was forced to leave Italy, and took refuge in Toulon. After the overthrow of Napoleon he escaped to Corsica, and set sail for the Neapolitan territory with a view to recover his kingdom. He landed at Pinzo on 8th October, but was immediately captured, tried by a court-martial, and shot.

MURCHISON (mér'chi-sun), Sir Rod-erick Impey, Scottish geologist, born at Tarradale, in Ross-shire, 1792; died 1871. By a comparison of specimens of the rocks of Australia with the auriferous rocks of the Ural Mountains, which he had personally examined, he was led, so early as 1845, to predict that gold would be found there. He was one of the founders and most active members of the British Association for the Advancement of Science. He was several times elected president of the Royal Geographical Society. He was made K.C.B. in 1853, and a baronet in 1863. His chief works are *Siluria*, *The Geology of Russia*, and numerous contributions to the transactions of the learned societies. He endowed the chair of geology in Edinburgh university.

MURCIA (mür'thi-ä), a city of South-

MURDER

ern Spain, capital of the ancient kingdom and modern province of same name. Pop. 111,539.—The province formed part of the ancient kingdom of Murcia; area, 5970 sq. miles; pop. 577,987.

MURDER, the act of unlawfully killing a human being with premeditated malice, the person committing the act being of sound mind and discretion, and the victim dying within a year and a day after the cause of death administered. In Britain it is the law that every person convicted of murder shall suffer death as a felon. In the United States of America the law recognizes degrees in murder, and in France and some other civilized nations "extenuating circumstances" are taken into consideration.

MURDOCH (mur'doh), William, an inventor, born near Auchinleck, Ayrshire, in 1754. At Redruth, in 1784, he constructed a model high-pressure engine to run on wheels, the precursor of the modern steam locomotive. In 1815 he introduced the hot-water apparatus which, with certain slight modifications, is now so extensively used for heating large buildings and conservatories. Various other inventions of his might be mentioned; but his work as a gas-inventor remains his most conspicuous achievement. In 1792 he first lighted his offices and cottage at Redruth with coal-gas, but it was not till 1798 that he constructed his first extensive apparatus at Birmingham for the making, storing, and purifying of gas, with a view to the supply of factories. Not long after this the offices at Soho were lighted with gas, and the new illuminant was brought prominently before public notice in 1802, when the exterior of the factory was lighted up in celebration of the Peace of Amiens. His great invention was never patented. He retired from business in 1830, and died in 1839.

MURGER (mur-zhār), Henri, born at Paris 1822, died 1861. He lived a life of extreme privation; formed an informal club or society of unconventional young artists and authors similarly situated which was named "Bohemia," and the associates "Bohemians"—a name famous in general literary history. He contributed a great mass of "copy" to numerous periodicals, and at last made a reputation by his *Scènes de la Vie de Bohême*. He also published two volumes of poetry, *Ballades et Fantaisies*, and *Les Nuits d'Hiver*; and wrote dramas for the Luxembourg theater, and tales, etc., for the *Revue des Deux Mondes*.

MURIATIC ACID, the older name of hydrochloric acid.

MURILLO (mū-rēl'yō), Bartolomeo Esteban, the greatest of Spanish painters, was born at Seville in 1618. He received his first instructions in art from his relation Juan del Castillo. In 1642 he visited Madrid, and was aided by Velasquez, then painter to the king, who procured him permission to copy in the Royal Galleries. Murillo returned to Seville in 1645, where he commenced that great series of works which have now made his name so glorious. He married a lady of fortune in 1648, which much aided his personal influence, and he succeeded in establishing an academy of the arts at Seville in 1660, and acted as president the first year. He died at

Seville 3d April, 1682, in consequence of a fall from a scaffolding at Cadiz, where he was engaged in the church of the Capuchins, painting a large altarpiece of St. Catharine. He obtained the



Murillo.

name of Painter of the Conception from his fondness for the subject of the Immaculate Conception. About 250 of his pictures are preserved in British and foreign galleries, and in Spanish churches.

MURPHY, Francis, an American temperance evangelist, born in 1836 in Wexford, Ireland. In 1870 he started temperance reform clubs. His headquarters were in Pittsburg, Pa., and 10,000,000 persons signed the pledge as a result of his ministrations in different parts of the United States. He labored also in England, and he acted as chaplain in the Spanish-American war.

MURRAIN, a name given in general to any widely prevailing and contagious disease among cattle, though in different localities it is also used as the name of some specific disease.

MURRAY, John, founder of the Universalist body in America, was born at Alton, England, in 1741. He preached his first sermon in America September 30, 1770, in an obscure place in New Jersey, called "Good Luck." He was prominent in the organization of a convention of his sect in 1785, and which took the name of Independent Christian Universalists. In 1793 he was installed pastor of a society of Universalists in Boston, where he remained till his death, September 3, 1815.

MURRAY, Lindley, grammarian, born in Pennsylvania, of Quaker parents, in



Lindley Murray

1745, died 1826. He wrote, besides his well-known English Grammar, several works on education and morals.

MUSCLE AND MUSCULAR MOTION

MURSHIDABAD', or **MOORSHEDABAD**, a city of India, Bengal. Pop. 28,553.—The district of Murshidabad has an area of 2144 sq. miles and a population of 1,335,374.

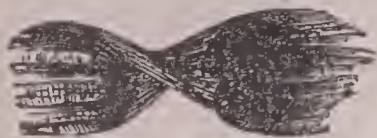
MUSCAT, or **MASKAT**, the chief city of the sultanate of Omán, or Muscat, a seaport on the Indian Ocean, near the east angle of Arabia. It is an important center of trade, exporting coffee, pearls, mother-of-pearl, dye-stuffs, drugs, etc., and importing rice, sugar, piece-goods, etc. Pop. of town and suburbs estimated at 60,000.

MUSCATEL', or **MUSCADEL**, a term for various sweet, strong, and fragrant wines.

MUS'CATINE, a town in Iowa, on the Mississippi, at the apex of what is called the Great Bend, and in connection with an extensive net-work of railways, 27 miles southeast of Iowa City. Pop. 16,170.

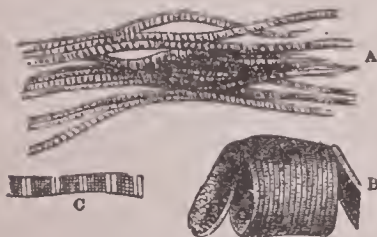
MUSCLE AND MUSCULAR MOTION, the name muscle is applied to those structural elements or organs in animals which are devoted to the production of movements either of a part of the body, or of the body as a whole. They consist of fibres or bundles of fibres, susceptible of contraction and relaxation, inclosed in a thin cellular membrane. Muscles are composed of fleshy and tendinous fibres, occasionally intermixed, but the tendinous fibres generally prevail at the extremities of the muscle, and the fleshy ones in the belly or middle part of it. When the fibres of a muscle are placed parallel to each other it is called a simple or rectilinear muscle; when they intersect and cross each other they are called compound. When muscles act in opposition to each other they are termed antagonist; when they concur in the same action they are called congenerous. Muscles are also divided into voluntary and involuntary muscles, the former being those whose movements proceed from an immediate exertion of the will, as in raising or depressing the arm, bending the knee, moving the tongue, etc., while the latter are beyond this control, being the agents in the contraction of the heart, arteries, veins, absorbents, stomach, intestines, etc. When examined under the microscope the fibres of the voluntary muscles (as also those of the heart) are seen to be marked by minute transverse bars or stripes, while those of the involuntary are smooth and regular in appearance. The former is therefore called striped or striated muscle, the latter unstriped, nonstriated, or smooth muscle. The great property of muscular tissue is the power of responding when irritated. The response is in the form of contraction, that is, when the muscle is irritated or stimulated it responds by shortening itself, so that its ends are brought nearer and it becomes thicker in the middle, its inherent elasticity making it capable of returning to its previous length when the stimulation is withdrawn. By these contractions the muscles are able to do work. The usual stimulation is by nervous action (see Nerve), but mechanical means, such as pinching, pricking, etc., electricity, heat, and chemicals also cause irritation. All the muscles are

connected with bones not directly but through the medium of tendons. A tendon presents the appearance of a white glistening cord, sometimes flat, but often cylindrical and of considerable thickness. The mass of flesh composing



A striped muscular fibre with its sheath.

the muscle is called the belly of the muscle. One end is usually attached to a bone more or less fixed, and is called the origin of the muscle. The other end is attached to the bone meant to be moved by the contraction of the muscle, and is called the insertion of the muscle. Involuntary muscle consists of spindle-shaped cells having an elongated nucleus in the center. They are united in ribbon-shaped bands, and respond much less rapidly than the voluntary to irritations, and the wave of contraction passes over them more slowly. There are several hundreds of separate muscles in the human body, and they are broadly grouped into muscles of the head, face,



Muscular fibre separated—A into fibrillae and B into discs. C is a highly magnified portion of a fibril.

and neck; muscles of the back; muscles of the chest; muscles of the upper extremity, the shoulder, arm, forearm, and hand; muscles of the abdomen, and muscles of the lower extremity, the thigh, leg, and foot.

MUSCOVY. See Russia.

MUSES, in the Greek mythology the daughters of Zeus and Mnemosynē, who were, according to the earliest writers, the inspiring goddesses of song, and according to later ideas divinities presiding over the different kinds of poetry, and over the sciences and arts. Their original number appears to have been three, but afterward they are always spoken of as nine in number: Clio, the muse of history; Euterpē, the muse of lyric poetry; Thalia, the muse of comedy, and of merry or idyllic poetry; Melpomēnē, the muse of tragedy; Terpsichōrē, the muse of choral dance and song; Erātō, the muse of erotic poetry and mimicry; Polymnia or Polyhymnia, the muse of the sublime hymn; Urania, the muse of astronomy; and Calliōpē, the muse of epic poetry.

MUSEUM, a building or apartment appropriated as a repository of things that have an immediate relation to literature, art, or science, and where the objects may be inspected by those who are curious in such matters. Of the

museums of Britain the British museum is the greatest—being perhaps the greatest in the world. Museums illustrative of the industrial arts, though of recent origin, are of great importance. Foremost among institutions of this kind in Britain may be instanced the South Kensington Museum. All the chief capitals of Europe and many large cities in the United States have valuable museums.

MUSHROOMS, the common name of numerous cryptogamic plants of the natural order Fungi. Some of them are edible, others poisonous. The species of mushrooms usually cultivated is the *Agaricus campestris*, or eatable agaric, well known for its excellence as an ingredient in sauces, especially ketchup. Mushrooms are found in all parts of the world, and are usually of very rapid growth. In some cases they form a staple article of food. In Tierra del Fuego the natives live almost entirely on mushrooms; in Australia many species of *Bolētus* are used by the natives, and is commonly called native bread. Mushroom spawn is a term applied to the reproductive mycelium of the mushroom.

MUSIC, any succession of sounds so modulated as to please the ear; also the art of producing such melodious and harmonious sounds, and the science which treats of their properties, dependencies, and relations. Sound is conveyed through elastic media, as the atmosphere or water, by undulations, which may be generated in the medium itself, as by a flute or organ-pipe, or transmitted to it by the vibrations of violin or pianoforte strings or the reeds of a wind-instrument. When the vibrations are fewer than 16 in a second or more than 8192 the sound ceases to have a musical character. The pitch or relative height of a tone is determined by the number of vibrations in a given tone, the lower numbers giving the grave or deep tones, the higher numbers the acute or shrill tones. The loudness of a tone is determined by the largeness of the vibrations, not their number. The note or musical sound called middle C on the pianoforte is usually assumed by theorists to be produced by 512 vibrations per second, and this was long the pitch recognized in practice as the standard or concert pitch useful for the guidance of all musicians. The perpetual striving after increased brilliance of tone led, however, to a gradual heightening of the pitch, and in the course of a century the middle C in France had become 522 vibrations, while in England and Germany it was somewhat higher. Of late years there has been a movement among European musicians to lower the pitch to about the French standard, and this lower pitch has now been adopted by many foreign nations.

A note produced by double the number of vibrations required to produce any given note will be found to be in perfect unison with it though higher in pitch. Between two such notes there is a gradation by seven intervals in the pitch of tone, more agreeable than any other, the whole forming a complete scale of music called the diatonic scale. The space between the notes sounding




in unison is termed an octave, and the note completing the octave may become the keynote of a similar succession of seven notes, each an octave higher or double the pitch of the corresponding note in the first scale. These seven notes of the diatonic scale are designated by the first seven letters of the alphabet, and each note bears a fixed ratio to the key-note in respect of pitch as determined by the number of vibrations. Thus in the case of a key-note obtained from a vibrating string, its octave is produced by halving the string, which vibrates twice as fast in a given time as the whole string, and the other notes may be obtained by applying reciprocally the ratios given below to the length of the string.

Taking C or Do for our fundamental note we have for our scale—

C D E F G A B C D E F G A B
C, &c. (Scale in key of C major) or Do Re Mi
Fa Sol La Si Do Re Mi Fa Sol La Si Do, &c.
1 2 3 4 5 6 7 2 (Ratio to key-note).

The scale may be extended up or down so long as the sounds continue to be musical. In order to allow reference to be made to the various degrees of scales without reference to the key in which they are pitched the tones composing the octave are known in their ascending order as (1) tonic or keynote, (2) supertonic, (3) mediant, (4) subdominant, (5) dominant, (6) superdominant or submediant, (7) leading note or subtonic, (8) final note. The tonic, the subdominant, and the dominant are the governing or emphatic notes of the scale. In the diatonic scale the various notes proceed from the key-note by five tones and two semitones; the semitones (the smallest intervals recognized in musical notation) occurring between the 3d and 4th and the 7th and 8th notes in the scale. The first four and last four notes, therefore, form a natural division of the octave into two "tetrachords," each consisting of two tones and a semitone.

Every sound employed in the art of music is represented by characters called notes on a staff—that is, five equidistant horizontal lines on or between which the notes are placed. A note represents a higher or a lower sound according as it is placed higher or lower on the staff. When any note is higher or lower in pitch than can be placed upon the staff short lines called ledger-lines are added above or below the staff to indicate the relation of the note to those on the staff. As, however, the multiplication of ledger-lines is liable to become embarrassing to the eye, musicians have endeavored to overcome the difficulty by the use of more than one staff. The staves are the bass, mean, and the treble, but the second is now seldom used. The treble staff, which contains the upper notes, is distinguished by a character called a G

or treble clef  the bass by a character called the F or bass clef  and the mean by a character called the C or mean clef  The treble and bass clefs only are required for keyed instruments

of the pianoforte kind, and when a staff is wanted for each hand they are joined by a brace, the upper staff carrying the notes generally played by the right hand and the lower those played generally by the left, as follows:



It will be seen that the steps in every diatonic scale must correspond to those of the scale of C, in that the notes composing it stand in the same fixed ratio to the keynote of the scale. In selecting another keynote than C, however, it is necessary to modify some of the natural notes by the insertion of what are called sharps or flats in order to preserve the required relation and sequence of the intervals (the tones and semitones in their due relative positions) and so produce the major musical progression. The sharp (#) placed before a note raises the pitch by a semitone, the flat (b) lowers it by a semitone. A sharp or flat placed at the beginning of a staff affects every note upon the line which it dominates, unless the contrary be indicated by the sign of the natural (n), which restores the note to which it is attached to its normal pitch. In the model diatonic scale given it has been pointed out that there is an interval of a tone between every note, except the 3d and 4th (E and F) and 7th and 8th (B and C), when the interval consists of a semitone. Now if we wish to make G the key-note it is clear that without some contrivance the notation of the scale from G to its octave would throw one of the semitones out of its place—namely, that between E and F, which, instead of being, as it ought to be, between the seventh and eighth, is between the sixth and seventh. It is obvious then that if we raise the F a semitone we shall restore the interval of the semitone to a position similar to that which it held in the key of C. If D be taken as a key-note we shall find it necessary to sharpen the C as well as the F in order to bring the semitones into their proper places. Still proceeding by fifths, and taking A as a key-note, a third sharp is wanted to raise G. We may proceed thus till we reach the scale of C sharp, with seven sharps, which is, however, rarely used. This series of scales with sharps is obtained by taking the dominant, first of the model scale as the key-note and then of the others in succession, and sharpening the fourth of the original scales to make it the seventh of the new. Another series is obtained by taking the subdominant of the model scale as the key-note and lowering its seventh a semitone, making it the fourth of the new scale, or scale of F. Taking the subdominant of the scale (B) as the key-note we require to flatten the E in addition to the B, and so on until we have lowered all the tones in the scale a semitone.

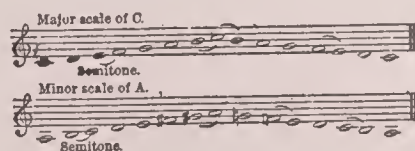
Besides the forms of the diatonic scale, which have an interval of two

tones between the tonic and the third, and is called the major scale, there are minor scales of which the most important kind has an interval of a tone and semitone between its tonic and third, the seventh note being sharpened so as to

form a leading note. In the ascending scale, too, the harsh interval of the second between this leading note and the one immediately below it is frequently avoided by sharpening the lower note. In the descending scale the sharps are removed, and the scale is identical with the major, beginning at its sixth and descending an octave. See example at top of next page.

Major and minor scales which, like those given in the example, have the same key signature, are called relative. Thus, the major scale of G has for its relative minor the scale of E minor, the major scale of D has for its relative minor the scale of B minor; and so on. Each minor scale is also called the tonic minor to the major scale on the same key-note. The tonic minor scale to C major is C minor. One major scale is also said to be related to another when it is raised from its dominant or its subdominant: thus the scales of G and F are held to be nearly related to that of C.

There is still another kind of scale, called the chromatic (Greek *chrōma*, color), because, like colors in painting

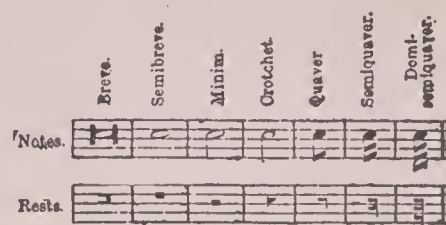


it embellishes the diatonic by its semitones. It consists of thirteen notes, and usually ascends by sharps and descends by flats.

Intervals in music (i.e. the distance from any one note to any other) are reckoned always upward and inclusively number of names of notes they contain, both limits to the interval being counted. Thus C to E is a third, both C and E being counted in the interval. They are known as major or normal when they are such as would be found in any major scale; as minor when the interval consists of a semitone less than the corresponding major interval; as augmented when consisting of a semitone more than major; as diminished when a semitone less than minor; and as simple or compound according as they fall within or exceed the compass of an octave.

Hitherto notes have been referred to only as representatives of the various sounds with reference to their pitch and distance from each other; but each note serves also to mark the relative duration of the sound it represents. The following are the names and forms of the notes commonly in use, each in succession

being half the duration of the note preceding it:



The stems of the notes may be written upward or downward as convenient. In connection with these notes other signs are used still further to indicate duration. A dot placed after a note lengthens it by one-half, two dots by three-fourths. Instead of the dot a note of its value may be written, and a curve, called a tie, written over it and the preceding note. Sometimes three notes of equal value have to be played in the time of two, in which case the figure 3 with a curve thrown over it is written above or below the notes. Two triplets (as this group is called) may be joined, and the figure 6 surmounted by a curve written over them; they are then performed in the time of four notes of the same form. A sensible interval of time often occurs between the sounding of two notes; this is represented by characters called rests, each note having a corresponding rest. A dot may be added to a rest in the same manner as to a note, to indicate an addition of a half to its length. See the example just given, which shows the rests in connection with their corresponding notes.

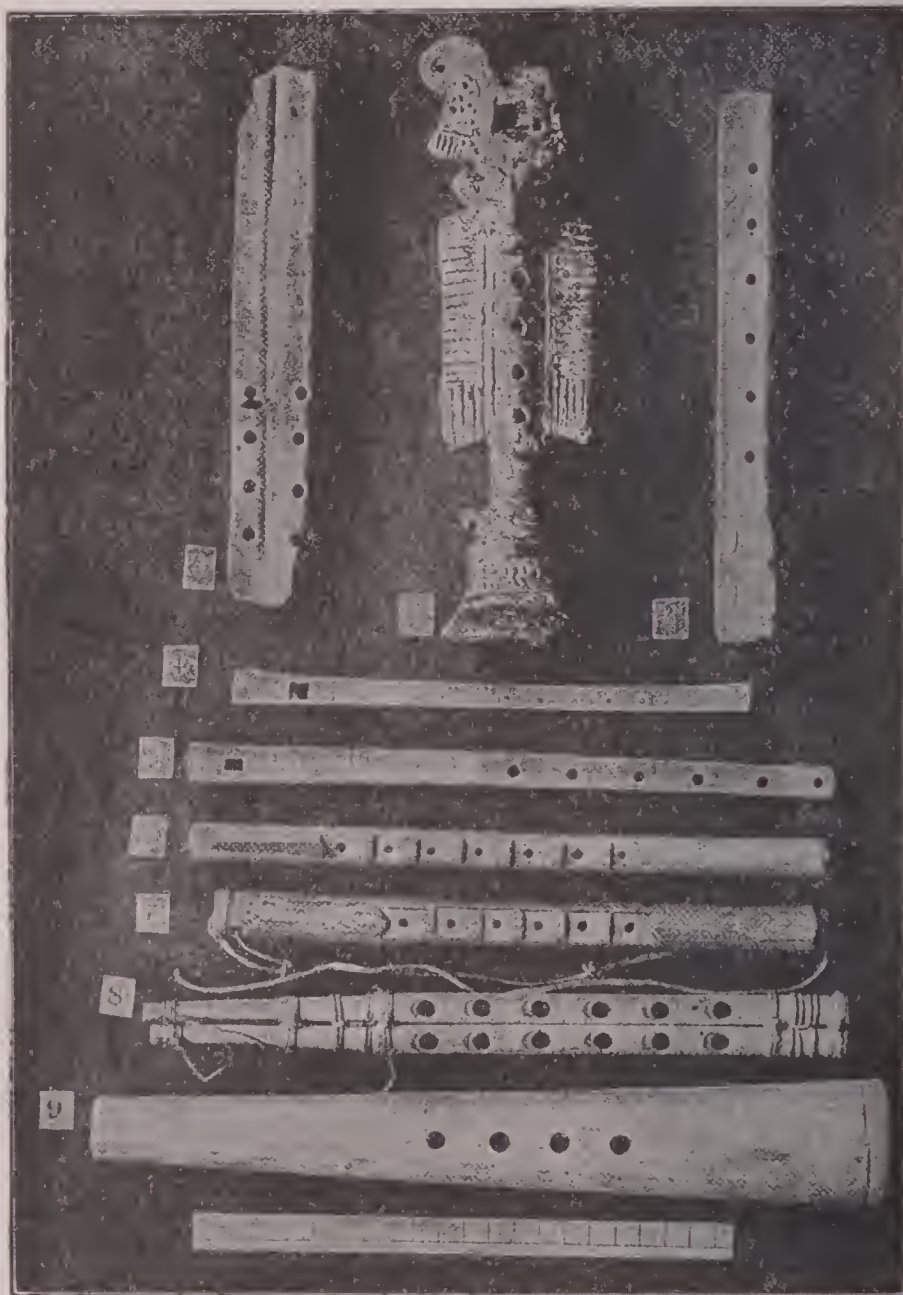
Every piece of music is divided into portions equal in time, called measures, which are separated from each other by vertical lines called bars. The term bar is often loosely applied to the measure as well as to the line. The exact length of the measure is indicated by a sign at the beginning of the piece of music. In common time, indicated by a C written after the clef, each measure contains a semibreve, or such notes and rests as make up together its value. Another form of common time, marked with a 2, contains two semibreves in the measure, or their equivalents in minims, crotchets, etc. Another method of indicating time (or rather more correctly, rhythm) is by figures, in the form of a fraction. The figures of the denominator are either 2, 4, 8, or 16, which (the semibreve being considered the unit) stand for minims, crotchets, quavers, and semiquavers respectively; and the numerator shows the number of these fractional parts of a semibreve in the measure. Besides common time, which may be indicated in two ways, there is triple time, in which a measure is made up of three minims, crotchets, or quavers, which can only be marked by figures; these are $\frac{3}{2}$, $\frac{3}{4}$, or $\frac{3}{8}$. When two or four measures or triple time are united in one measure the music is said to be written in compound common time, and is indicated by the fractions $\frac{2}{1}$ and $\frac{4}{1}$; rarer examples of compound time signatures are $\frac{3}{1}$, $\frac{3}{2}$, $\frac{1}{1}$, $\frac{1}{2}$, etc. The object of the division of musical passages into measures is to indicate their rhythm.

Notes, like words or syllables, are accented or unaccented. The strongest accent is given to the first note of a measure. In common time of four notes to the measure the third has a subordinate accent, as, though in a less degree, the third measure note in triple time. In compound common time the subordinate accents falls on the first note of the last half of the measure, and in compound triple time on the first note of each of the groups of three of which the measure is composed. When a curve is placed over two notes in the same degree, but not in the same bar, the two notes are played as one of the length of both, and the first note acquires the accent. This displacement of the accent is called syncopation. If the curve is written over notes of different degrees it is called a slur, and indicates that the notes are to be played or sung smoothly, as if gliding into each other. When an opposite effect is wanted, that is, when the notes are to be produced distinct and detached (*staccato*), a dot is placed over them. The various degrees of loudness and softness which occur in a piece of music are indicated by such Italian words as *forte*, loud; *fortissimo*, very loud; *piano*, soft; *pianissimo*, very soft. In order to save time in writing music various abbreviations are used.

MUSICAL INSTRUMENTS, any device for the production of sounds, whether of discord or concord, supposed to arouse emotion of any kind, pleasant or unpleasant, in the hearer. The origin of many musical instruments dates back to the earliest times. Monuments recently unearthed at Thebes and in the upper valley of the Nile contain representations of harps and flutes. Even so recent an instrument as our grand pianoforte can be traced through its many and vital changes to the dulcimer known to the Arabs and Persians. Many of our museums are filled with various instruments of all times and nations preserved only as curiosities. Thus the large family of lutes is now entirely obsolete; and yet at one time these instruments enjoyed the same popularity as the pianoforte does to-day, and no orchestra was complete without them. If we except the stringed instruments, it may safely be asserted that no instrument found in the modern orchestra is the same as it was a century ago. Musical instruments may be divided into three classes: stringed, wind, and percussion. Stringed instruments are of three kinds: those whose sounds are produced by friction, as the violin, viola, violoncello, etc.; by twitching with the finger or otherwise, as the harp, guitar, mandolin, etc.; by striking, as the pianoforte, and dulcimer. Wind instruments are of two kinds, viz., the reed species—as the hautboy, clarinet, etc.—and the flute species, as the flute, flageolet, etc. The trumpet, horn, trombone, and all similar wind instruments, are generally classed among the reed instruments; but whether the sound is produced by the lips of the blower acting as a reed, or by the compressed stream of air, as in flute instruments, is not yet determined. Percussion instruments are those which on being struck produce only one fixed

sound, as the drum, triangle, cymbals, tambourine, etc. Whatever material may be used to form a musical instrument, there are only two means of producing musical sounds, and these are by the vibrations of a fixed elastic body, such as the string of the violin or pianoforte, the reed of the hautboy, bassoon etc.; or by the vibrations of a confined column of air put into motion by a

by filling or loading with lead the individual teeth are accurately attuned. Each tone and semitone in the scale is represented by three or four separate teeth in the comb, to permit of successive repetitions of the same note when required by the music. The teeth are acted upon and musical vibrations produced by the revolution of a brass cylinder studded with projecting pins,



Early flutes with equal-spaced holes.

stream of compressed air, as in the flute, flageolet, and all the ordinary flute species of organ-pipes.

MUSIC-BOX, an instrument for producing by mechanical means tunes or pieces of music. The modern music-box is an elaboration of the elegant toy musical snuff-box in vogue during the 18th century. The notes or musical sounds are produced by the vibration of steel teeth, or springs cut in a comb or flat plate of steel. The teeth are graduated in length from end to end of the comb or plate, the longer teeth giving the deeper notes; and, where necessary,

which, as they move around, raise and release the proper teeth at due intervals according to the nature of the music. An entire revolution of the cylinder completes the performance of the special pieces of music for which the apparatus is set, but upon the same cylinder there may be inserted pins for performing as many as thirty-six separate airs. This is accomplished by making both the points of the teeth or springs and the projecting pins which touch them very fine, so that a very small change in the position of the cylinder is sufficient to bring an entirely distinct set of pins in contact

with the note teeth. In the more elaborate music-boxes the cylinders are removable, and may be replaced by others containing distinct sets of music. In these also there are combinations of bell, drum, cymbal, and triangle effects, etc. The revolving motion of the cylinder is effected by a spring and clockwork, and the rate of revolution is regulated by a fly regulator. The headquarters of the music-box trade is Geneva, where the manufacture gives employment to upward of 1000 persons.

The music-box is a type of numerous instruments for producing music effects by mechanical means, in all of which a revolving cylinder or barrel studded with pins is the governing feature. The principle of the barrel operating by percussion or by wind on reeds, pipes, or strings governs carillons or music bells, barrel organs, mechanical flutes, celestial voices, harmoniphones, and the sometimes huge and complex orchestrions in which a combination of all orchestral effects is attempted. A principle of more recent introduction than the studded cylinder consists of sheets of perforated paper or card, somewhat similar to the Jacquard apparatus for weaving. The perforations correspond in position and length to the pitch and duration of the note they represent, and as the web or long sheet of paper passes over the instrument, the perforated holes are brought in proper position and sequence under the influence of the suction or pressure of air from a bellows, and thereby the notes are either directly acted on, as in the case of reed instruments, or the opening and closing of valves set in motion levers or liberate springs which govern special notes. The United States is the original home of the instruments controlled by perforated paper known as organettes, organinas, melodeons, pianola, etc. See Phonograph.

MUSK, a substance used in perfumery and medicine, and obtained from several species of deer. A perfume of similar character is also obtained from one or two other animals, (see Musk-rat); and various animals and plants are noted for emitting a strong, musky smell.

MUSK-DEER, a genus of deer, which is essentially distinct from the true deer.



Musk-deer.

Their chief habitat is Asia and the islands of the Eastern Archipelago; though one species is found on the west coast of Africa. These animals attain the size of

a young roe-deer, and the upper jaws bear prominent canine teeth. The males alone yield the musk, which is secreted by an abdominal gland of about the size of a hen's egg. The Tibet musk is most in repute, that known as Russian or Siberian being inferior in quality. Besides its familiar use as a scent, musk is employed medicinally as an antispasmodic.

MUSKE'GON, a city in the state of Michigan, situated at the upper end of Lake Muskegon. It does a great trade in lumber, the timber being floated down the Muskegon river, and passing through extensive sawing and planing mills here. Pop. 24,501.

MUSKET, a hand-gun with which infantry soldiers were formerly armed. When first introduced, early in the 16th century, as a development of the culverin and arquebus, it was discharged by means of a lighted match (hence the name matchlock given to it), and was so heavy that it had to be laid across a staff or rest to be fired. To make use of it the soldier required to carry a slow-burning match with him, which was apt to be extinguished in wet weather. The wheel-lock followed (16th century), the chief feature of which was a wheel made to revolve by means of a spring, and to cause sparks by friction against a flint. The next improvement was the flint-lock proper (about 1625), in which sparks were produced by one impact of a piece of flint on the steel above the priming powder. Musketeers were soon introduced into all armies, and in the beginning of the 17th century infantry consisted of pikemen and musketeers, and all changes in regard to the relative proportion of the two arms were always in favor of the latter. The flint-lock musket was introduced into the British army toward the end of the 17th century, and was the British musket of the days of the Peninsular war and Waterloo, known familiarly as "Brown Bess." It was superseded by the percussion musket in 1842, this musket being in turn superseded by the rifle. See Rifle.

MUSKINGUM, a river in the state of Ohio, United States, and falling into the Ohio river at Marietta. It is connected with Lake Erie by canal.

MUSK-MALLOW, a British perennial plant, so named from the peculiar musky odor thrown off by the parts of the plant.

MUSK-MELON, a delicious variety of melon, named probably from its fragrance.

MUSK-OX, an animal intermediate between the ox and sheep. Resembling in general appearance a large goat-like sheep, its body is covered with a coat of tufted hair, brownish in color and of great length. The hair about the neck and shoulders is so thick as to give the animal a "humped" appearance; on the rest of the body it is very long, smooth, and flowing, while interspersed among its fibres is a layer of lighter-colored wool. The musk-ox is active and agile, and climbs mountainous places with ease and dexterity. The horns, broad at the base and covering the forehead and crown, curve downward between the eye and the ear, and then upward and slightly backward. The horns of the female are smaller than those of the

male, and their bases do not touch. The ears are short, the head large and broad, the muzzle blunted. The average size of the male is that of a small domestic ox. Gregarious in habits, each herd numbers from twenty to thirty members. The female brings forth one calf in May or June. The food consists of grass, lichens, etc. The musk-ox inhabits the Arctic regions of America north of the 60th degree of latitude. The flesh is pleasant to the taste, though it smells strongly of musk; the odor of which is also diffused from the living animal.

MUSK-PLANT, a little yellow-flowered musky-smelling plant, a native of Oregon.

MUSK-RAT, an American rodent allied to the beaver, and the only known species of the genus. It is about the size of a small rabbit, and has a flattened lanceolate tail, covered with small scales and a few scattered hairs. Its toes are separate, and provided with a stiff fringe of hair. In summer it has a smell of musk, which it loses in winter. The odor is due to a whitish fluid deposited in certain glands near the origin of the tail.

MUSLIN, a fine, thin, cotton fabric, first made at Mosul or Moussul (whence the name), afterward in India. There are many different kinds made, as book, mull, jaconet, leno, foundation, etc. Some Indian muslins are of extraordinary fineness. Figured muslins are wrought in the loom to imitate tambooured muslins, or muslins embroidered by hand.

MUSSEL, a term popularly given to several molluscs, in which "siphons" or tubes admitting water to the gills, are absent. The common mussel forms a typical example, the shells being equi-valve and have a hinge destitute of teeth. It has a "byssus" or "beard," by means of which the mussels attach themselves to fixed objects. The mussel is extensively employed as a bait for deep-sea fishermen; and in some districts it is used as an article of food, the best mussels approaching nearly to the oyster in flavor, though occasionally found to be unwholesome. The pond mussels, of which many species are known, are found in the rivers and lakes both of Europe and America.

MUSSET (mu-sâ), Louis Charles Alfred de, French poet, novelist, and dramatist, born at Paris in 1810, died there in 1857. In 1829 he published a volume of poems called *Contes d'Espagne et d'Italie*, which had an immediate and striking success. In 1831 appeared *Poésies Diverses*, and in 1833 *Un Spectacle dans un Fauteuil*, in which the two chief pieces are a comedy of a light and delicate grace called *A quoi Révent les Jeunes Filles*, and a poem entitled *Namouna*, written after the manner of Byron. In 1836 was published his *Confession d'un Enfant du Siècle*, a gloomy novel, containing the analysis of a diseased state of mind, all the phases of which the author had studied in himself. The same settled melancholy also distinguishes his *Rolla*, *Une Bonne Fortune*, *Lucie*, *Les Nuits*, *Une Lettre à Lamartine*, *Stances à Madame Malibran*, *L'Espoir en Dieu*, and other poems. Among his light and sparkling dramatic pieces are: *On ne badine pas avec l'*

Amour, Les Caprices de Marianne, Il ne faut pas jurer de Rein, etc. In 1852 he was admitted a member of the French Academy. De Musset was one of the most distinctive, and, in a certain sense, original of modern French writers.

MUSSULMAN. See Moslem.

MUST, the juice of grape, which by fermentation is converted into wine.

MUSTANG, a small wild horse of the Southwestern states and northern Mexico, where it is found in extensive herds, and is captured and tamed as the Indian pony. A reversion from the domesticated stock, it seldom exceeds 13 hands in height, but is a strong and useful animal, and capable of great endurance.

MUSTARD, the seeds of the white and common mustard, when ground and freed from husks, form the well-known



Mustard.

condiment. The plant is an annual, with stems 3 to 4 feet in height, lower leaves lyrate, upper lanceolate and entire, flowers small and yellow. The preparation from the seeds is often very valuable as a stimulant to weak digestion, and as an adjunct to fatty and other indigestible articles of food. When mixed with warm water and taken in large quantities it acts as an emetic. The tender leaves are used as a salad, and the seeds are used in the well-known form of poultice, being applied to various parts of the skin as a rubefacient. Oil of mustard is an essential oil obtained from the seeds. It is very pungent to the taste and smell, and when applied to the skin speedily raises a blister.

MUTINY, resistance by soldiers or sailors to the authority of their officers. Joining in inciting to or conniving at mutiny is punishable with death, whether the troops are on active service or not; on active service the same sentence may follow treachery or cowardice, deserting a post, etc.

MUTTRA, a town in India, United Provinces, on the Jumna, 36 miles northwest of Agra. Pop. 60,042.—The Muttra district has an area of 1453 sq. miles; pop. 763,221.

MY'LODON, a genus of extinct edentate mammalia, allied to the megatherium. Its remains have been found in the upper tertiaries of South America. In size the mylodon robustus—the most familiar species—attained a length in some instances of 11 feet. Of terrestrial habits, the mylodon obtained the vegetable food upon which it subsisted chiefly by uprooting trees.

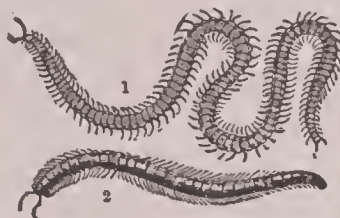
MYO'PIA, the scientific name for shortsightedness. See Sight, Defects of.

MYRIAP'ODA, the lowest class of the higher annulose or arthropodous animals



Skeleton of Mylodon.

represented by the centipedes, millepedes, and their allies, and resembling the Annelids in the lengthened form and the numerous segments of the body, each segment being provided with one pair of ambulatory feet, whence the name. They have a distinct head, but no division of the body into thorax and abdomen, as in insects. They are therefore of a lower structural type than insects, which in general organization they resemble. No wings are developed. They respire through minute spiracles or pores along the whole length of the body, and are invested with a hard or horny covering. This class is divided into two orders, the Diplopoda, in which the fusion of two rings gives apparently two pairs of feet on each ring; and the Chilopoda,



Myriapoda.

1, *Geophilus sefeborii*, one of the Chilopoda. 2, *Iulus plicatus*, one of the Chilognatha.

which have two pairs of foot-jaws, and not more than one pair of feet on each segment.

MYRRH is the name given to a gum resin which exudes from a shrub growing



Myrrh.

in Aradia and Abyssinia. It was much esteemed as an unguent and perfume by the ancients, who used it also for embalming and for incense. It is still used

as a perfume and for incense, as also medicinally. By distillation with water myrrh yields a viscid, brownish-green, volatile oil. Myrrh of the best quality is known as Turkey myrrh; that of an inferior kind goes under the name of East Indian, being exported from Bombay.

MYRTLE, a genus of plants, consisting of aromatic trees or shrubs, with simple opposite leaves sprinkled with pellucid glandular points, and having axillary or terminal white or rose-colored flowers. One species, the common myrtle is a native of the south of Europe and other countries bordering on the Mediterranean. It has been celebrated from remote antiquity on account of its fragrance and the beauty of its evergreen foliage, and by different nations was con-



1, branch with flowers of myrtle; 2, branch with fruit; 3, vertical section of a flower; 4, calyx, torus, and pistil of the fruit; 5, vertical section of the seed, showing the embryo.

secrated to various religious purposes. With the moderns it has always been a favorite ornamental plant.

MYSOR', or **MYSORE',** a principality of southern India; area, 27,936 sq. miles. Pop. 5,538,482.

MYSOR, the capital of the state of the same name, 250 miles west by south of Madras, stands at an elevation of 2450 feet above the level of the sea. Pop. 68,151.

MYSTICISM, a word of very vague signification, applied sometimes to views or tendencies in religion which aspire toward a more direct communication between man and his Maker through the inward perception of the mind, than that which is afforded through revelation or to efforts and inclinations by some special and extraordinary means to hold intercourse with divine powers or the inhabitants of higher worlds. According to John Stuart Mill, "whether in the Vedas, in the Platonists, or in the Hegelians, mysticism is neither more nor less than ascribing objective existence to the subjective creations of our own faculties, to ideas or feelings of the mind, and believing that, by watching and contemplating these ideas of its own making, it can read in them what takes place in the world without." The tendency toward mysticism seems naturally implanted in some natures, and has been observed in all ages. It is a characteristic feature of the great Asiatic re-

ligions, Brahmanism and Buddhism. In the Neo-Platonic philosophy it is an important element, as represented by Plotinus (204-269 A.D.). Christianity, in consequence of its special tendency to practical good, as well as of its submission to a system of doctrine expressly revealed, would seem to have afforded little scope for the extravagances of mysticism. It soon, however, made its appearance, forming a kind of profane mixture, and reached its extreme in the writings of the so-called Dionysius the Areopagite. This pseudo-Dionysius obtained an extensive influence, especially through Hugo St. Victor, in the 12th century, and was everywhere held in high respect until the time of the Reformation. In opposition to scholasticism, which labored in the construction of a systematic and almost demonstrative theology, this system embodied a theology of feeling and immediate illumination, which attached very little importance to intellectual effort, and laid so much the more weight on purification of heart and ascetic morality. Of the most notable of the German mystics in the middle ages were Eckhart and Tauler. In the philosophy of the 15th and 16th centuries, in Paracelsus, Bruno, and others mysticism took a direction which at a later period gave rise, on the one side, to the alchemists and Rosicrucians, and on the other side to a number of religious sects, of which such men as Jacob Böhmen and Swedenborg may be considered the representatives. The Quietism of Madame Guyon and her adherents (such as Fénelon) in France in the 18th century was a product of the same nature.

MYTHOLOGY, the collective name for the whole body of fables, legends, or traditions (myths) that take their rise at an early period of a nation's existence and of its civilization, and that embody the convictions of the people among whom such fables arise as to their gods or other divine personages, their origin and early history and the heroes connected with it, the origin of the world, etc. Though speculations as to the origin of mythology have been put forth from a very early period, it is only in recent times, by the help of comparative philology, and by comparing together the myths of different peoples (comparative mythology), that any real advance has been made. Myths are of course believed in by the bulk of the people among whom they are current, and it is only when speculative and reflective spirits arise, and when science and philosophy have made some advances, that their truth is called in question. Thus Zeus, Apollo, Athênē, Heracles, and the other divinities of ancient Greece, were believed by the bulk of the people to have a real existence, and the stories regarding them

were looked upon as true; but even in Greece in early times the absurdities and monstrosities of some of the myths attracted the attention of philosophers and led to attempts at explaining the stories in such a way as that they should not shock common sense or moral feeling. In doing this three chief systems of interpretation were followed, called respectively by Max Müller the ethical, the physical, and the historical. Those who adopted the first explained that the stories of the power and omniscience of the gods, of their rewarding good and punishing evil, were invented by wise men for the purpose of maintaining law and order in communities—leaving it to be supposed that the immoral representations of the gods were the inventions of poets. The interpreters of the physical (also called the allegorical) school held that the myths contained explanations of natural phenomena, or of certain views regarding them, under a peculiar phraseology, which disclosed its hidden wisdom when rightly understood. The third or historical school, identified with the name of Euhemerus, represented the gods as having been originally kings or chiefs, great warriors, sages, or benefactors of the human race, who, being exalted above their fellowmen in life, after their death gradually came to be looked upon as deities.

Perhaps the most common theory of mythology at the present day is one that is based upon comparative philology, and on a comparison of the myths of the different Indo-European nations. Thus in early times men would speak quite naturally of the sun as the child of the night, as the destroyer of the darkness, as the lover of the dawn and as deserting her, as traveling over many lands, as the child of the morning, as her husband, as her destroyer, and so on. This language was natural in early times, and was perfectly understood as descriptive simply of natural phenomena, and nothing else; but in course of time such expressions lost their natural significance, and in this way it is explained that Phœbus Apollo, Endymion, and Phaëthon, for instance, all originally significant epithets applied to the sun from his brilliancy or other characteristic, became the names of divinities, who were regarded as quite distinct from each other. So Zeus originally meant the sky, Athênē and Daphnē the dawn, Hermes the wind, and so on. According to this theory the story of Apollo slaying the children of Niobē with his arrows is nothing more than a mythological way of telling how the morning clouds are dispersed before the rays of the rising sun. Heracles or Hercules, again, is the sun laboring throughout his life for the benefit of others: soon after birth he strangles

the serpents of darkness, and after performing innumerable toil he dies on the funeral pyre, as the sun sinks in the fiery west. Endymion, as his name implies, is the setting sun, who is courted by the moon, and who sinks to sleep in the west. Some of these identifications of deities with natural phenomena are pretty certain. Zeus, for instance, the supreme god of Greece, the same as the Jupiter of the Romans and the Dyaus of the early Hindus, is clearly the bright sky; and among the Hindus the name of the sky-god Dyaus always retained its meaning of sky, so that Dyaus had only an indistinct personality as a deity. The Hindu Varuna, a sky-god, is clearly the same as the Greek Ouranos, which latter word, besides being the name of a deity, had the ordinary signification of sky or heaven. So the Scandinavian Thor, the god of thunder, can hardly be anything else than thunder personified. Yet as a whole the "solar theory" cannot be accepted as a key to all mythology. It fails to account for many of the wild and monstrous myths told of deities, of the creation of the world, of the state of the dead, etc., and though it may throw a certain amount of light on the mythology of the Aryan or Indo-European nations, is quite insufficient when myths as a whole are investigated.

Another road has been taken therefore by some recent investigators. Thus Mr. Andrew Lang finds a key to mythology in a study of the myths and mental habits of savage races; he maintains that "the savage and senseless element in mythology is for the most part a legacy from ancestors of the civilized races who were in an intellectual state not higher than that of Australians, Bushmen, Red Indians, the lower races of South America, and other worse than barbaric peoples," and that the monstrous myths current in Greece, Egypt, and India were thus inherited. He points to the currency of such myths among savages at the present day, and to the fact that in general savages are eager to arrive at some explanation of the natural phenomena around them, and are quite satisfied with explanations that to civilized men may seem even imbecile. When a phenomenon presents itself the savage requires an explanation, and that explanation he makes for himself, or receives from tradition, in the shape of a myth. But, indeed, no one theory can be expected to explain the origin of all myths, for it is impossible to deny that some may be pure products of imagination, tales invented by early bards or minstrels to beguile a weary hour, while in others fragments of real history may be hidden.

MYTILENE, or **MITYLENE**, a town in the island of Lesbos. See Lesbos.

N

N, the fourteenth letter and eleventh consonant of the English alphabet; formed by placing the point of the tongue against the root of the upper teeth and forcing out the breath. It is classed as a nasal, a lingual, and liquid or semi-vowel. In English and most other languages n has a pure nasal sound in French and Portuguese, after a vowel in the same syllable, as on, un, etc., it has the effect of giving a semi-nasal sound to the vowel preceding, that is to say, the vowel is sounded by an emission of the breath partly through the nose and partly through the mouth. The Spanish alphabet has a character ñ, called n with the tilde, as in España, pronounced like ni in onion, minion; gn in Italian is pronounced in the same way.

NA'BOB, in India, formerly the title of a governor of a province or the commander of the troops; borne, however, by many persons as a mere titular appendage.

NABONASSAR, a king of Babylon, with whose reign begins an epoch called the Era of Nabonassar. It began on the 26th of February, 747 or 746 B.C.

NA'DIR, in astronomy, that point of the heavens which is diametrically opposite to the zenith, or point directly over our heads. The zenith and nadir are the two poles of the horizon.

NADIR SHAH, King of Persia, a famous conqueror and usurper, was born in 1688. Having distinguished himself against the Afghans and Turks he acquired the chief power in Persia in 1732, seized the shah, confined and deposed him, and proclaiming his son Abbas, then an infant, in his stead, assumed the title of regent. The young king dying in 1736, he seated himself on the throne as shah. He undertook the conquest of India, at the head of 120,000 men, and with little resistance reached Delhi in March, 1739. Being exasperated by some tumults on the part of the inhabitants he caused a general massacre, in which upwards of 100,000 persons perished. In this expedition it is supposed that he carried away, and distributed among his officers, valuables to the amount of \$560,000,000. A conspiracy having been formed against him by the commander of his body-guard and his own nephew, he was assassinated in his tent in 1747, his nephew, Ali Kuli, succeeding to the throne.

NADIYA, or **NUDDEA**, a district in the lieutenant-governorship of Bengal, with an area of 2794 sq. miles. Pop. 1,644,108.

NÆVUS, or "**MOTHER'S MARK**," a disfigurement which occurs most frequently on the head and trunk, but may also appear on the extremities. It consists essentially of an enlargement of the minute veins, or venous capillaries, which are dilated, and anastomose or unite among themselves to form a vascular patch generally of a deep-red color. The familiar name of "mother's mark," or "longing mark," is applied from the popular belief that the lesion was the result of fear, fright, unnatural longing, or some such irritation acting upon the

mother's constitution, and communicating its effects to the unborn child in the shape of this mark.

NAGASA'KI, or **NANGASA'KI** a city and port in Japan, on the west coast of the island of Kiusiu, beautifully situated on a peninsula at the extremity of a harbor, affording excellent anchorage, and inclosed by hills, up the sides of which a portion of the town extends. Nagasaki was one of five Japanese ports opened in 1858 to the British and Americans, having been previously open to



the Dutch; and in 1869 it and seven others were opened to foreign nations generally. The exports are copper, silk, camphor, tobacco, porcelain, lackered wares, etc. A dry-dock measuring 460 by 89 feet was opened here in May, 1879. Pop. 107,422.

NAGPUR, or **NAGPORE**, a town in India, capital of the Central Provinces, and of the division of Nagpur (area 24,040 sq. miles; pop. 2,716,748), 440 miles e.n.e. of Bombay. A bed of coal, estimated to contain 17,000,000 tons at a depth of 200 feet, has been discovered at Nagpur. There is a trade in opium, hemp, and above all, in cotton, for which this is a great mart. Nagpur was formerly the seat of a line of rajahs, which became extinct in 1853, when their territory was annexed to the British dominions. Pop. 127,734.

NA'IADS, in the Greek mythology, nymphs of fountains and brooks, of similar character to the dryads, oreads, etc., analogous to the nixies of the northern mythology.

NAID'IDÆ, a family or group of water-worms, some of them of common occurrence in the mud of ponds and streams.

NAILS (of Animals), like hairs, are appendages which belong to the category of the exoskeletal elements of the animal frame, or as parts of the skin,

of the outer layer of which they are modified appendages. A nail, in fact, is a specialized arrangement of the cells of the epidermis. In man the nails do not inclose the ends of the digits; but in the horse, and "hoofed" or ungulate quadrupeds generally, the nails assume the form of protective coverings to the digits, and are then known as "hoofs." Nails may be produced to form "claws," as in birds and carnivorous mammals, while in the sloths they assume a large relative size, and are used as a means in arboreal progression. In the Amphibia—as in some toads, efts, etc.—the nails appear as mere thickenings of the skin at the extremities of the digits. The nails appear about the fifth month of foetal or embryonic life.

NAILS, small pointed pieces of metal, generally with round or flattened heads, used for driving into timber or other material for the purpose of holding separate pieces together. They are of many different lengths and shapes. Brads used for nailing floors and ceilings have the head only on one side; the small sharp nails with round flat heads, used by saddlers and upholsterers, are called tacks; the small sharp taper nails without heads, used by shoemakers, are called sprigs; a variety in which the head is large and the spike small are called hobnails; very large nails are called spikes. Until a comparatively recent period almost every kind of nail was produced by hand labor alone, each nail being separately forged from a thin rod of iron. These wrought nails are preferable, for many kinds of carpenter work, to those made by machinery. Making of wrought nails retains, in many places, the character of a domestic manufacture, the workmen being often assisted by the female members of his family. In 1810 a machine was contrived by which nails could be cut from an iron sheet, and headed at one operation, at the rate of 100 per minute. Since that time great improvements have been made in nail-making machinery, and the method commonly adopted is to cut nails out of sheet-iron of the required thickness, an operation which, by the improved processes, is carried on with great rapidity. The quantity produced in this way is astounding, some mills turning out at the rate of 10 miles of nail-rods an hour.

NAMAQU'ALAND, Great, an extensive region in South Africa, extending along the west coast from the Orange river to Walfish Bay, and inland from the west coast to the Kalahari Desert; estimated area 100,000 sq. miles. Pop. about 50,000.

NAMES, Personal. It is probable that at first all names were significant. Old Testament names are almost all original, that is, given in the first instance to the individual bearing them, and either originated in some circumstance of birth or expressed some religious sentiment, thus—Jacob (supplanter), Isaiah (salvation of Jehovah), Hannah (favor), Deborah (bee), etc. Neither the Hebrews,

Egyptians, Assyrians, Babylonians, Persians, nor Greeks had surnames; and in the earliest period of their history the same may be said of the Romans. In course of time, however, every Roman citizen had three, the prænomen or personal name, the nomen or name of the gens or clan, lastly, the cognomen or family name, as Publius Cornelius Scipio. Conquerors were occasionally complimented by the addition of a fourth name or agnomen, commemorative of their conquests, as Publius Cornelius Scipio Africanus. Greek names refer to the personal appearance or character; and were often supplemented by the occupation, place of birth, or a nickname. Times of great public excitement have had a very considerable influence in modifying the fashion in names. It is impossible to state with any degree of certainty when the modern system of personal nomenclature became general. Surnames were introduced by the Norman adventurers, but were for centuries confined to the upper classes. They became general in Scotland about the 12th century. In some of the wilder districts of Wales they can hardly be said to have been adopted even yet. The principal sources from which surnames are derived are personal characteristics (Black, Long, Short), rank, profession, or occupation (Bishop, Knight, Miller), localities or natural objects (Hill, Dale, Stone), and patronymics (Johnson, Wilson, Andrews). The Hebrews had no surnames proper, but to distinguish two men of the same name they used the form Solomon ben David (Solomon son of David). The Welsh used the word ap in the same way; Evan ap Richard (John son of Richard = Prichard). In most countries the wife changes her surname on marriage to that of her husband; in Spain, however, she retains it, while the son may adopt either the paternal or maternal name. In Great Britain a man may now change his Christian name and surname without an act of parliament, royal license, or even public advertisement; but there is no law to compel third parties to use the new name.

NAMUR (nā-mūr), a town of Belgium capital of province of same name, situate at the confluence of the Meuse and Sambre, and at the foot of a bold promontory on which is a fortress. There is a fine modern cathedral (1751-67). The town has manufactures of cutlery, hardware, etc. Pop. 31,558.—The province has an area of 1413 sq. miles. It has coal-mines and flourishing industries. Pop. 344,323.

NANA SAHIB, the infamous leader of the Sepoys in the Indian Mutiny. He was born in 1825, and adopted by the ruler of the state of Bithoor. On the death of the latter the British refused to recognize Nana as his successor. In May, 1857, Nana placed himself at the head of the mutineers at Cawnpore. The Europeans there capitulated on a promise that they should be sent away in safety. But the men were shot down and the women and children massacred. (See Cawnpore.) Nana was defeated by Sir H. Havelock, and was driven across the frontier into Nepaul, and there all knowledge of him ceases.

NANCY (nān-sē), a town of France, capital of the dep. Meurthe-et-Moselle, in a fertile plain, near the left bank of the Meurthe. The manufactures embrace woolens, cottons, hosiery, lace, embroidery, stained-paper, etc. Pop. 102,559.

NANKING', a city of China, capital of the province of Kiangsu. It is one of the chief literary centers of China. Pop. estimated at 150,000.

NANSEN, Fridtjof, Norwegian explorer, born in 1861, studied at Christiana University, and in 1882 made an Arctic voyage in a sealing vessel. In 1888 he crossed Greenland from sea to sea a little north of latitude 64°. In 1893 he sailed on board a specially-built steamer (the Fram) in the expectation that, entering the Polar ice in the neighborhood of the New Siberian islands, he would be drifted by a current over the Pole and would come out on the east side of Greenland. After being carried so far in the desired direction he left the Fram and crew, and with a single companion, and with sledges, dogs, and kayaks, took the ice. In this way he reached the highest latitude yet attained, 86° 14' (April, 1895), and then turned southwestward to Franz Josef Land, where he spent the winter of 1895-96 and met Mr. Jackson, leader of an expedition sent from England, with whom he returned, being followed soon after by the Fram.

NANTES (nānt), a town of France capital of the department of Loire-Inférieure, on the right bank of the Loire where it receives both the Erdre and the Sèvre, 269 miles west-southwest of Paris. The public edifices most deserving of notice are the cathedral, in the Flamboyant style, dating from the 15th century, and containing many fine monuments; the castle, an edifice of the 14th century partly modernized in the 16th, with massive round towers; the Hôtel de Ville, the exchange, the theater museum of natural history, picture-gallery, the courts of justice, and the Hôtel Dieu or infirmary. The chief industries are ship-building, and the manufacture of ships' boilers and machinery, linens, cottons, sail-cloth, flannel, chemicals, leather, ropes, soap, etc. Pop. 132,990.

NANTES, Edict of, was signed by Henry IV. in that city, April 30, 1598. It allowed the Protestants the free exercise of their religion, and threw open to them all offices of state. This edict was formally revoked by Louis XIV. on October 20, 1685. As a consequence of this fatal act for France about 400,000 Protestants, forming the most intelligent and industrious section of the people, emigrated to Britain, Holland, and other Protestant countries, much to the benefit of their adopted homes.

NANTICOKE, a town in Luzerne co., Pa., on the Susquehanna river, and the Cent. of N. J., the Penn., and the Del., Lack. and W. railways; 8 miles s.w. of Wilkesbarre, the county seat. Pop. 14,517.

NAPHTHA, a term which includes most of the inflammable liquids produced by the dry distillation of organic substances. Mineral or native naphtha, or petroleum, is an inflammable liquid

which is found in nearly all countries, but especially at Baku, on the Caspian Sea, and in Canada and Pennsylvania. It consists of a mixture of hydrocarbons chiefly belonging to the paraffin series, but it also contains members of the olefin and of the benzene series. Boghead naphtha, which is also known as photogen and paraffin oil, is obtained by distilling certain minerals allied to coal, such as the Torbane Hill mineral or Boghead coal, found at Bathgate in Scotland. Coal naphtha is obtained by the distillation of coal-tar. After the light oil has been separated it is shaken with caustic soda and afterward with sulphuric acid. The liquid portion is then run off and rectified. Shale naphtha is a mixture of paraffins obtained by distilling bituminous shales. When petroleum is distilled, that portion which distills below 76° C. is sold as petroleum spirit or petroleum ether, and is used for dissolving india-rubber and making varnishes. The next fraction of the distillate is sold under the names benzoline, paraffin oil, or mineral sperm oil. Benzene occurs in petroleum, but is more abundant in the light oil obtained in distillation of coal-tar. Nitro-benzene is largely employed in the preparation of aniline.

NAPIER (nā'pi-ēr), Sir Charles James, British general and administrator, born in 1782. He entered the army in 1794. In 1812 he was made lieutenant-colonel. In 1837 he was made major-general; in 1838 K.C.B. In 1841 he was appointed to the chief command in the presidency of Bombay, with the rank of major-general, and was shortly afterward called to Scinde. Here he gained the splendid victories of Meanee and Hyderabad, and was afterward made governor of Scinde, which he administered till 1847. Having returned to England, he died in 1853.

NAPIER, Admiral Sir Charles, British naval commander, was born in 1786; died in 1860. He entered the navy as



General Sir Charles Napier.

midshipman in 1799, was promoted lieutenant in 1805. He was promoted commander in August, 1809, and in 1811 was employed in Portugal and along the coast of Southern Italy. Returning to England, he was appointed in 1839 to the command of the Powerful, and ordered to the Mediterranean, where on the outbreak of the war between Mehemet Ali and the Porte, and the co-operation of Britain with Russia and Austria on behalf of the latter

power, Sir Charles Napier performed some of his most gallant exploits, including the storming of Sidon and the capture of Acre. Having blockaded Alexandria, he concluded on his own responsibility a convention with Mehemet Ali, by which the latter and his family were guaranteed in the hereditary sovereignty of Egypt on resigning all claim to Syria. On his return to England he was created K.C.B. He sat in Parliament as member for Southwark from 1855 till his death.

NAPIER, John, Laird of Merchiston, near Edinburgh, the inventor of logarithms, was born 1550, died 1617. In 1614 he published his book of logarithms (*Logarithmorum Canonis Descriptio*; Edinburgh, 4to). The invention was very soon known over all Europe, and was everywhere hailed with admiration by men of science.

NAPIER, Robert Cornelius, Baron Napier of Magdala, born in Ceylon Dec. 6, 1810. He entered the Royal Engineers in 1826, and served in the Sutlej campaign in 1845-46, where he was severely wounded. In 1867 he was intrusted with the command of the Abyssinian expedition, and captured Magdala, April 13, 1868. He was then made Baron Magdala and G.C.B. In 1870 he was made commander-in-chief in India, with the rank of general, became governor of Gibraltar in 1876, was made field-marshal in 1883, and constable of the Tower in 1887. He died in 1890.

NAPIER, Sir William Francis Patrick, British officer, was born in 1785, died in 1860. At the age of fourteen he entered the army, became lieutenant-colonel in 1813, and colonel in 1830. Some years after the conclusion of peace he commenced his celebrated *History of the Peninsular War*, the publication of which began in 1828, and extended over the intermediate period till 1840. In 1841 Colonel Napier was advanced to the rank of major-general; he was appointed lieutenant-governor of Guernsey the following year and in 1848 created a K.C.B.

NAPLES (nā'plz), a city in Southern Italy, the largest in the kingdom, situated on the northern shore of the beautiful Bay of Naples, about 160 miles from Rome. The city is divided into two unequal parts by a steep ridge proceeding from the height on which stands the castle of St. Elmo, and terminated by a rocky islet surmounted by the Castello dell' Ovo. Among the more remarkable public edifices is the cathedral, dating from 1272, a large Gothic building erected on the site of two temples dedicated to Neptune and Apollo. Other edifices are the church De' Santi Apostoli, said to have been originally founded by Constantine the Great on the site of a temple of Mercury, and, though subsequently rebuilt, still very ancient; the church of St. Paul, built in 1817-31 in imitation of the Pantheon at Rome; the Palazzo Reale (Royal Palace, a building of great size in the lower part of the town); the palace of Capo di Monte situated on a height in the outskirts; the old palace, where the courts of justice now hold their sittings; the Palazzo dei Pubblici Studj, formerly occupied by the university, but now converted

into the Museo Nazionale, a museum containing not only a valuable library of 275,000 volumes and many rare MSS., but also the older and more recent collections belonging to the crown, the Farnese collection of paintings and sculpture from Rome and Parma, and an unequalled collection of gems, bronzes, vases, etc., chiefly obtained from the excavations of Pompeii and Herculaneum; numerous theaters, of which that of San Carlo is remarkable for its magnificence, and is one of the largest in existence. Naples has a university, dating from 1224, and attended by over 3000 students; many other educational institutions, and numerous hospitals and charitable foundations. The manufactures, which are numerous but individually unimportant, include macaroni, woollens and cottons, silks known as gros de Naples, glass, china,

the revolution Napoleon took the popular side, but in a quiet and undemonstrative way. In 1792 he became captain of artillery, and in 1793 he was sent, with the commission of lieutenant-colonel of artillery, to assist in the reduction of Toulon, then in the hands of the British. The place was captured (19th December) entirely through his strategic genius; and in the following February he was made a brigadier-general of artillery. In 1795, when the mob of Paris rose against the convention, Napoleon was made commander of the 5000 troops provided for its defense. He had only a night to make arrangements, and next morning he cleared the streets with grape, disbanded the national guard, disarmed the populace, and ended the outbreak. On the 9th March 1796, he married Joséphine Beauharnais, and soon after he had to depart to



musical instruments, flowers and ornaments, perfumery, soap, chemicals, machinery, etc. Naples is one of the most densely populated cities of Europe, and one of the most peculiar features of the city is its unique population and the universal publicity in which life is passed. In the environs are situated the tomb of Virgil, the ancient ruined cities of Herculaneum and Pompeii, the remains of Roman temples, villas, palaces, and tombs, together with the physical phenomena of Vesuvius. Pop. 563,751.

NAPLES, Bay of, on the west coast of Italy, in the Mediterranean, extending for about 20 miles from the Capo di Miseno, its n.w. boundary, to the Punta della Campanella, its s.e. limit. It is separated from the open sea by the islands of Procida, Ischia, and Capri. Its shores have for ages been the scene of powerful volcanic agency, and the scenery has long been celebrated for its beauty and grandeur. Mount Vesuvius is the most striking and distinctive feature.

NAPOLEON I., Emperor of the French, was born August 15, 1769, at Ajaccio, Corsica, and was the son of Charles Bonaparte, an advocate, and of Letizia Ramolino. (See Bonaparte.) In his tenth year he was sent to the military school of Brienne, and after a short time spent at that of Paris he received, in 1785, his commission as lieutenant of artillery. During the development of

assume the command of the army of Italy against the forces of Austria and Sardinia. After a series of victories, culminating in that of Lodi (10th May), Naples, Modena, and Parma hastened to conclude a peace; the pope was compelled to sign an armistice; and the whole of Northern Italy was in the hands of the French. Army after army sent by Austria was defeated (at Roveredo, Bassano, Arcole, Rivoli, etc.), Napoleon carried the war into the enemy's country; and by the Peace of Campo Formio, which followed (Oct. 17, 1797), Austria ceded the Netherlands and Lombardy, and received the province of Venetia. The pope had previously been forced to cede part of his dominions.

In December, 1797, Napoleon returned to Paris. About this time the directory determined to invade Egypt, as a preliminary step, to the conquest of British India. Napoleon was put in command of the expedition, and on the 1st July, 1798, he landed at Alexandria. This city fell on the 4th July, and Cairo was taken on the 24th, after the sanguinary battle of the Pyramids. On Aug. 4th Nelson annihilated the French fleet in the Bay of Aboukir. All means of return to Europe for the French were then cut off; but Napoleon, having suppressed with rigor a riot in Cairo, advanced to attack the Turkish forces assembling in Syria. He took El Arish and Gaza, and stormed Jaffa. But after sixty days'

siege he was compelled to abandon the attempt to capture Acre, which was defended by a Turkish garrison under Djeddar Pasha, assisted by Sir Sidney Smith and a small body of English sailors and marines. He re-entered Cairo on the 14th June, 1799, and on the 25th July attacked and almost annihilated a Turkish force which had landed at Aboukir. On the 22d August he abandoned the command of the army to Kléber, and embarking in a frigate landed at Fréjus, 9th October, having eluded the English cruisers. He hastened to Paris, secured the co-operation of Moreau and the other generals then in the capital, and abolished the Directory on the 18th and 19th Brumaire (9th-10th November). A new constitution was then drawn up chiefly by the Abbé Siéyès, under which Napoleon was made first consul, with Cambacérès and Lebrun as second and third consuls. From this time he was virtually ruler of France.

Napoleon's government was marked by sagacity, activity, and vigor in the administration of civil affairs, and so far was highly beneficial to France. But war was his element, and in 1800 he resolved to strike a blow at Austria. Having executed a daring march into Italy across the Great St. Bernard he defeated the Austrians at Marengo, and after the decisive battle of Hohenlinden Austria obtained peace by the Treaty of Lunéville, 1801. Treaties were subsequently concluded with Spain, Naples, the pope, Bavaria, Portugal, Russia, Turkey, and finally, on the 27th March, 1802, the treaty known as that of Amiens was signed by Britain. In 1802 Napoleon was proclaimed by a decree of the senate consul for life, and in 1804 he had himself crowned as emperor, upward of 3,000,000 votes of the people being given in favor of this measure. To this period belongs the famous body of laws known as the Code Napoléon. See Code.

In 1803 war had again broken out with Britain, and Napoleon collected an army and flotilla which were to invade England. In 1805 Britain, Russia, Austria, and Sweden united against Napoleon, who marched at once across Bavaria at the head of 180,000 men, and compelled the Austrian General Mack to capitulate at Ulm with 23,000 men (20th October), the day before Nelson's great victory at Trafalgar. On the 13th November he entered Vienna, and on December 2, having crossed the Danube, he completely routed the allied Russian and Austrian armies at Austerlitz. The Austrian emperor instantly sued for peace, giving up to France all his Italian and Adriatic territories. In February, 1806, a French army occupied the continental part of the Neapolitan states, of which Joseph Bonaparte was declared king on the deposition of their former sovereign. Another brother of the emperor, Louis, became king of Holland. Various districts in Germany and Italy were erected by the conqueror into dukedoms and bestowed upon his most successful generals. This brought him into collision with Prussia, and war was declared on 8th October. On the 14th Napoleon defeated the enemy at

Jena, while his general, Davoust, on the same day gained the victory of Auerstädt. On the 25th Napoleon entered Berlin and issued the celebrated Berlin Decrees, directed against British commerce. He then marched northward against the Russians, who were advancing to assist the Prussians. At Pultusk (28th December) and at Eylau (8th February, 1807), he met with severe checks; but on the 14th June was fought the battle of Friedland, which was so disastrous to the Russian arms that Alexander was compelled to sue for an armistice. On the 7th July the Peace of Tilsit was concluded, by which the King of Prussia received back half of his dominions, and Russia undertook to close her ports against British vessels. The Duchy of Warsaw was erected into a kingdom and given to the King of Saxony; the Kingdom of Westphalia was formed and bestowed upon Jérôme, Napoleon's youngest brother; and Russia obtained a part of Prussian Poland, and by secret articles was allowed to take Finland from Sweden. As Portugal had refused to respect the Berlin Decrees, Napoleon sent Junot to occupy Lisbon (30th November, 1807). The administrative affairs of Spain having fallen into confusion, Napoleon sent an army under Murat into that kingdom, which took possession of the capital, and by the Treaty of Bayonne Charles IV. resigned the Spanish crown, which was given to Joseph Bonaparte, Murat receiving the vacant sovereignty of Naples. The great body of the Spanish people rose against this summary disposal of the national crown, and Britain aided them in their resistance. Thus was commenced the Peninsular war, which lasted seven years. A French squadron was captured by the British at Cadiz (June 14, 1808); General Dupont surrendered at Baylen with 18,000 men (22d July); Junot was defeated by Sir Arthur Wellesley (Wellington) at Vimeira (21st August). But Napoleon rushed to the scene of action in October at the head of 180,000 men, and entered Madrid in spite of all resistance by the Spaniards on the 4th December. The British troops, now under Sir John Moore, were driven back upon Corunna, where they made a successful stand, but lost their general (16th January, 1809). In the meantime Austria again declared war and got together an army in splendid condition under the Archduke Charles. Napoleon hurried into Bavaria, encountered the archduke at Eckmühl (22d April), and completely defeated him; on the 13th May he again entered Vienna. On May 21st and 22d he was himself defeated at Aspern and Esslingen; but on the 6th July the Austrians were crushed at Wagram, which enabled Napoleon to dictate his own terms of peace; these were agreed to on the 14th October at Schönbrunn. On his return to Paris Napoleon was divorced from Joséphine who had borne him no children, and on the 2d April, 1810, he was married to the Archduchess Maria Louisa of Austria. The fruit of this union was a son.

The years 1810 and 1811 were the period of Napoleon's greatest power. On the north he had annexed all the coast-line as far as Hamburg, and on the

south Rome and the southern Papal provinces. But now the tide began to turn. Russia found it impossible to carry out the continental blockade and give due effect to the Berlin decrees; so in May 1812 Napoleon declared war against that country, and soon invaded it with an army of about 500,000 men. The Russians retired step by step, wasting the country, carrying off all supplies, and avoiding as far as possible general engagements. The French pushed rapidly forward, defeated the Russians at Borodino and elsewhere, and entered Moscow only to find the city on fire. It was impossible to pursue the Russians farther, and nothing remained but retreat. The winter was uncommonly severe, and swarms of mounted Cossacks incessantly harassed the French, now sadly demoralized by cold, famine, disease, and fatigue. Of the invaders only about 25,000 left Russia. Napoleon immediately ordered a fresh conscription, but the spirit of Europe was now fairly roused. Another coalition, consisting of Prussia, Russia, Great Britain, Sweden, and Spain, was formed, which early in 1813 sent its forces toward the Elbe. Napoleon had still an army of 350,000 in Germany. He defeated the allies at Lützen, at Bautzen, and at Dresden; but the last was a dearly-fought victory for the French, who were now so outnumbered that their chief was compelled to fall back on Leipzig. There he was completely hemmed in, and in the great "Battle of Nations," which was fought on the 16th, 18th, and 19th October, he was completely defeated. He succeeded in raising a new army, and from January to March, 1814, he confronted the combined hosts of the allies. But numbers were against him; and Wellington, having driven the French out of the Peninsula, was advancing from the south. On the 30th March the allies captured the fortifications of Paris, and next day they entered the city. On 4th April Napoleon abdicated at Fontainebleau. He was allowed the sovereignty of the island of Elba, with the title of emperor and a revenue of 6,000,000 francs, and Louis XVIII. was restored. After a residence of ten months he made his escape from the island, and landed at Fréjus on the 1st March, 1815. Ney and a large part of the army joined him, and he made a triumphal march upon Paris; but it was mainly the army and the rabble that he now had on his side. The allied armies once more marched toward the French frontier, and Napoleon advanced into Belgium to meet them. On the 16th June he defeated Blücher at Ligny, while Ney held the British in check at Quatre-Bras. Wellington fell back upon Waterloo, where he was attacked by Napoleon on the 18th, the result being the total defeat of the French. The allies marched without opposition upon Paris. Napoleon abdicated in favor of his son, and tried to escape from France, but failing he surrendered to the captain of a British man-of-war. With the approval of the allies he was conveyed to the island of St. Helena, where he was confined for the rest of his life. He died in May, 1812, and was buried in the island, but in 1840 his remains were

transferred to the Hôtel des Invalides, Paris.

NAPOLEON II., Napoleon François Joseph Charles Bonaparte, only son of the preceding, was born in Paris 1811; died at Schönbrunn 1832. In his cradle he was proclaimed King of Rome. On the first abdication of the emperor he accompanied his mother, Maria Louisa of Austria, to Vienna. His title there was Duke of Reichstadt. He never assumed the title of Napoleon II.; but on the accession of his cousin Louis Napoleon in 1852, some title being necessary, the late emperor took that of Napoleon III., which being recognized by the governments of Europe, implied the recognition of the former title.

NAPOLEON III., Charles Louis Napoleon Bonaparte, Emperor of the French was born at Paris 1808; died at Chiselhurst, England, 1873. He was the youngest son of Louis Bonaparte, brother of Napoleon I. and king of Holland, and of Hortense de Beauharnais. His early life was spent chiefly in Switzerland and Germany. By the death of his cousin the Duke of Reichstadt (Napoleon II., see above) he became the recognized head of the Bonaparte family, and from this time forward his whole life was devoted to the realization of a fixed idea that he was destined to occupy his uncle's imperial throne. In 1836 an attempt was made to secure the garrison of Strasburg, but the affair turned out a ludicrous failure. The prince was taken prisoner and conveyed to Paris, and the government of Louis Philippe shipped him off to the United States. The death of his mother brought him back to Europe, and for some years he was resident in England. In 1840 he made a foolish and theatrical descent on Boulogne; was captured, tried and sentenced to perpetual confinement in the fortress of Ham. After remaining six years in prison he escaped and returned to England. On the outbreak of the revolution of 1848 he hastened to Paris, and securing a seat in the national assembly, he at once commenced his candidature for the presidency. On the day of the election, 10th December, it was found that out of 7,500,000 votes Louis Napoleon had obtained 5,434,226; Cavaignac, who followed second, had but 1,448,107. On the 20th the prince-president, as he was now called, took the oath of allegiance to the republic. He looked forward to a higher position still, however, and pressed for an increase of the civil list from 600,000 franc first to 3,000,000, then to 6,000,000, with his term of office extended to ten years, and a residence in the Tuileries. At last, on the evening of the 2d December, 1851, the president declared Paris in a state of siege, a decree was issued dissolving the assembly, 180 of the members were placed under arrest, and the people who exhibited any disposition to take their part were shot down in the streets by the soldiers. Another decree was published at the same time ordering the re-establishment of universal suffrage, and the election of a president for ten years. When the vote came to be taken, on the 20th and 21st of the same month, it was discovered that 7,439,218 suffrages were in favor of his

retaining office for ten years, with all the powers he demanded, while only 640,737 were against it. As soon as Louis Napoleon found himself firmly seated he began to prepare for the restoration of the empire. In January, 1852, the national guard was revived, a new constitution adopted, and new orders of nobility issued; and at last, on the 1st of December, Louis Napoleon Bonaparte was proclaimed emperor under the title of Napoleon III. On the 29th January, 1853, the new sovereign married Eugénie Marie de Montijo, countess de Teba; the result of this union being a son, Napoleon-Louis, born 16th March, 1856. In March, 1854, Napoleon III., in conjunction with England, declared war in the interest of Turkey against Russia. (See Crimean War.) In April, 1859, war was declared between Austria and Sardinia, and Napoleon took up arms in favor of his Italian ally, Victor Emanuel. The allies defeated the Austrians at Montebello, Magenta, Marignano, and Solferino. By the terms of the Peace of Villafranca Austria ceded Lombardy to Italy, and the provinces of Savoy and Nice were given to France in recognition of her powerful assistance (10th March, 1860). In 1860 the emperor sent out an expedition to China to act in concert with the British; and in 1861 France, England, and Spain agreed to despatch a joint expedition to Mexico for the purpose of exacting redress of injuries, but the English and Spaniards soon withdrew. The French continued the quarrel and an imperial form of government was initiated, Maximilian, archduke of Austria, being placed at its head with the title of emperor. Napoleon, however withdrew his army in 1867, and the unfortunate Maximilian, left to himself, was captured and shot. On the conclusion of the Austro-Prussian war of 1866 Napoleon, jealous of the growing power of Prussia, demanded a reconstruction of frontier, which was peremptorily refused. The ill-feeling between the two nations was increased by various causes, and in 1870, on the Spanish crown being offered to Leopold of Hohenzollern, Napoleon demanded that the king of Prussia should compel that prince to refuse it. Notwithstanding the subsequent renunciation of the crown by Leopold war was declared by France (19th July). (See Franco-German war.) On the 28th July Napoleon set out to take the chief command, and on 2d September the army with which he was present was compelled to surrender at Sedan. One of the immediate consequences of this disaster was a revolution in Paris. The empress and her son secretly quitted the French capital and repaired to England, where they took up their residence at Camden House, Chiselhurst. Here they were rejoined by the emperor (who had been kept a prisoner of war for a short time) in March, 1871, and here he remained till his death. His only child, the prince imperial, who had joined the British army in South Africa as a volunteer, was killed by the Zulus 2d June, 1879.

NARCIS'SUS, according to Greek mythology the son of the river-god Cephissus. The young Narcissus was of surpassing beauty, but excessively vain

and inaccessible to the feeling of love. Echo pined away to a mere voice because her love for him found no return. Nemesis determined to punish him for his coldness of heart, and caused him to drink at a certain fountain, wherein he saw his own image, and was seized with a pas-



Narcissus.

sion for himself of which he pined away. The gods transformed him into the flower which still bears his name.

NARCIS'SUS, an extensive genus of bulbous plants. The species are numerous, and from their hardiness, delicate shape, gay yellow or white flowers, and smell, have long been favorite objects of cultivation, especially the daffodil, the jonquil and white narcissus.

NARCOT'IC, derived from a Greek term signifying numbness or torpor, is the name given to a large class of substances which, in small doses, diminish the action of the nerves. Most narcotics are stimulating when given in moderate doses; in larger doses they produce sleep; and in poisonous doses they bring on stupor, coma, convulsions, and even death. Opium, hemlock, henbane, belladonna, aconite, camphor, digitalis, tobacco, alcohol, leopard's-bane, and a variety of other substances, are narcotics.

NARSINGHPUR, chief town of district of the same name, Central Provinces of India. Pop. 10,222. The district has an area of 1916 sq. miles, and pop. 313,829.

NARVAEZ (nár-vä'eth), Ramon Maria, Duke of Valencia, Spanish statesman and general, born 1800, died 1868. Early in life he entered the Spanish army and he rapidly acquired distinction. When Gomez, the Carlist general, was engaged in his adventurous march through Spain in 1836, Narvaez, who then commanded a division under Espartero, was directed to pursue him, and totally routed him near Arcos. Having taken part in an unsuccessful rising of the progressista party in 1838, he fled to France and remained there five years. In 1843 he hastened to Spain, put himself at the head of an insurrection, and entered Madrid victorious (July, 1843). In the following year he formed his first ministry, and received from Queen

NARWHAL

Isabella the rank of marshal and the title of Duke of Valencia. His government was overthrown in 1846, but he was soon recalled, and during the remainder of his life was several times intrusted with the formation of a cabinet.

NARWHAL, a cetaceous mammal found in the northern seas, averaging from 12 to 20 feet in length. The body color is whitish or gray spotted with darker patches. There is no dorsal fin. The dentition of the narwhal differs from that of all other members of the dolphin family. In the female both jaws are toothless, but the male narwhal has two canines in the upper jaw, which are



Narwhal or sea-unicorn.

sometimes developed into enormous projecting tusks, though commonly only the one on the left side is so developed, being straight, spiral, tapering to a point and in length from 6 to 10 feet. It makes excellent ivory. From the frequency with which the narwhal appears as having a single horn it has obtained the name of the Sea-unicorn, Unicorn-fish, or Unicorn Whale. The food of the narwhal appears to consist chiefly of mollusca, and notwithstanding its formidable armature it is said to be inoffensive and peaceable. The Greenlanders obtain oil from its blubber, and manufacture its skin into useful articles.

NASHUA, a manufacturing town in New Hampshire, county of Hillsborough, 35 miles south of Concord, at the junction of Merrimac and Nashua rivers. It has several extensive cotton manufactories, and manufactures of steam-engines, locks, guns, tools, shuttles, carpets, etc. Pop. 25,382.

NASHVILLE, the capital of the State of Tennessee and of Davidson co., on the left bank of the Cumberland, on



State capitol, Nashville, Tenn.

rocky bluffs rising above the river. The state capitol on Capitol Hill is a fine building. The town has no fewer than four universities: Nashville University, with a specially important medical school; Vanderbilt University; Fisk University for colored students; and Roger Williams (Baptist) University. Nash-

ville is a great commercial center, having a large trade in cotton and tobacco. There are cotton factories and other works. Pop. 1909, 135,000.

NASHVILLE, UNIVERSITY OF, situated at Nashville, Tenn., one of the leading educational institutions of the southwest. The university has a collegiate department with an attendance of over 600, a medical school, and a preparatory department with over 300 students in each.

NASIK, a district in Bombay, British India; area, 5940 sq. miles. Pop. 781,206. The chief town is Nasik, which ranks among the most sacred places of

Hindu pilgrimage, and is a place of considerable industrial importance. Pop. 21,490.

NASMYTH, James, born in Edinburgh 1808. The steamhammer, which has rendered possible the immense forgings now employed, was invented by him in 1839. The steam piledriver, and the safety foundry ladle, are among his other inventions. He was also a skilled astronomer. He died in 1890.

NASR-ED-DEEN, Shah of Persia, born 1829, succeeded 1848. In 1856 his occupation of Herat involved him in war with Britain. He made two journeys to western Europe, in 1873 and 1889. In his reign telegraphic communication between Europe and India through Persia was secured. He was assassinated in 1896.

NAST, Thomas, American illustrator, born at Landau, Bavaria, in 1840. He came to the United States with his parents in 1846. He went to England in 1860 and then traveled to Italy to follow Garibaldi, making sketches of the war. Returning to America, he formed a connection with Harper's Weekly. In 1862 his drawings of scenes from the American civil war, published in Harper's periodicals, attracted wide attention. In 1872 he started Nast's Illustrated Almanac, and illustrated The Tribute Book, Nasby's Swinging 'round the Circle, and other works, including Dickens' Pickwick Papers and Pictures from Italy. In 1894 he was with the Pall Mall Magazine, London. On May 1, 1902, he was appointed as consul-general to Guayaquil, Ecuador, where he died on December 7th of the same year.

NASTUR'TIUM, the genus to which the water-cress belongs. Also a popular name for Indian cress, an American climbing annual with pungent fruits and showy orange flowers.

NATAL, a British colony on the southeast coast of Africa, bounded on the land side by Cape Colony, Basutoland, Orange River Colony, Transvaal, and Portuguese territory; area, including Zululand and the Vryheid district, etc., detached from

NATTERJACK

the Transvaal in 1902, is 36,450 sq. miles. The only spot where sheltered anchorage can be obtained is at Port Natal, a fine circular bay near the center of the coast. Pop. 993,000, comprising 73,000 whites, 70,000 Indians, and 850,000 natives (chiefly Kaffirs).

NATCHEZ, a city of the United States in the state of Mississippi and on the river Mississippi, 279 miles above New Orleans. It is built on a bluff 150 feet above the water, and on the narrow strip of land between the foot of the hill and the river. Natchez is a great cotton mart, and has an increasing trade. Pop. 13,870.

NATICA, a genus of gasteropodous molluscs, forming the type of the family Naticidae. The shell is globular, with few whorls. Seven or eight species are British.

NATION, either a people inhabiting a certain extent of territory and united by common political institutions, such as the English nation; or an aggregation of persons of the same ethnological family and speaking the same or a cognate language.

NATIONAL AIRS, any class of airs peculiarly identified with the music of some particular people, and especially a tune which by national selection or consent is adapted to words which represent or reflect a sentiment, taste, or habit of a nation, and which is usually sung or played on certain public occasions.

NATIONAL CHURCH, the established church of a country or nation. In England the national church is Protestant and Episcopalian; in Scotland, Protestant and Presbyterian. See Established Church.

NATIONAL DEBT, the sum which is owing by a government to individuals who have advanced money to the government for public purposes, either in the anticipation of the produce of particular branches of the revenue, or on credit of the general power which the government possesses of levying the sums necessary to pay interest for the money borrowed or to repay the principal. See Funds.

NATIONALISTS, the term applied to the Irish political party whose programme includes the more or less complete separation of Ireland from Great Britain. See Home Rule.

NATIONAL LEAGUE. See Land League.

NATIONAL PARK. See Yellowstone, Yosemite, Northwest Territories.

NATIONS, LAW OF. See International Law.

NATIVITY. See Astrology.

NATRON LAKES, several lakes or pools rich in natron in the vicinity of Zakook, a village about 60 miles w.n.w. of Cairo.

NATTERJACK, Natterjack Toad, the *Bufo calamita*, a species of toad found in various parts of western Europe, in certain parts of Asia (including Tibet), and not uncommon in England. The general color is lightish-brown, spotted with patches of a darker hue. A line or streak of yellowish tint passes down the middle line of the back. It does not leap or crawl like the common toad, but rather runs, whence it has the name of walking or running toad. It has a deep and

hollow voice, audible at a great distance. It is often found in dry situations.

NATTOR', a town of India, in Bengal, on the Nadar river, an offshoot of the Ganges. Pop. 9094.

NATURAL GAS, a gas found issuing naturally from crevices in the earth's surface in various localities. It burns like ordinary coal gas, and consists of a mixture of various hydro-carbons, the chief ingredient being marsh-gas (fire-



Natterjack.

damp). It has long been known and utilized to some extent as an illuminant, but only in recent years has it attained much importance, being now largely employed in the United States both for lighting purposes and as a fuel. It is most abundant in the petroleum regions.

NATURAL HISTORY, in its widest sense, that department of knowledge which comprehends the sciences of zoology and botany, chemistry, natural philosophy or physics, geology, palaeontology, and mineralogy. It is now, however, commonly used to denote collectively the sciences of botany and zoology, and it is sometimes restricted to denote the science of zoology alone.

NATURALISM, the doctrine that all the operations in the universe, moral as well as physical, are carried on in accordance with fixed laws, and without the interference of any supernatural power.

NATURALIZATION. See Alien.

NATURALIZATION LAWS OF THE UNITED STATES, the conditions under and the manner in which an alien may be admitted to become a citizen of the United States are prescribed by sections 2, 165-74 of the revised statutes of the United States.

The alien must declare upon oath before a circuit or district court of the United States or a district or supreme court of the territories, or a court of record of any of the States having common law jurisdiction and a seal and clerk, two years at least prior to his admission, that it is, bona fide, his intention to become a citizen of the United States, and to renounce forever all allegiance and fidelity to any foreign prince or state, and particularly to the one of which he may be at the time a citizen or subject.

He must at the time of his application to be admitted declare on oath, before some one of the courts above specified, "that he will support the constitution of the United States, and that he absolutely and entirely renounces and abjures all allegiance and fidelity to every foreign prince, potentate, state or sovereignty, and particularly, by name, to the prince, potentate, state, or sovereignty of which he was before a citizen or subject,"

which proceedings must be recorded by the clerk of the court.

If it shall appear to the satisfaction of the court to which the alien has applied that he has made a declaration to become a citizen two years before applying for final papers, and has resided continuously within the United States for at least five years, and within the state or territory where such court is at the time held one year at least; and that during that time "he has behaved as a man of good moral character, attached to the principles of the constitution of the United States, and well disposed to the good order and happiness of the same," he will be admitted to citizenship. If the applicant has borne any hereditary title or order of nobility he must make an express renunciation of the same at the time of his application.

Any alien of the age of twenty-one years and upward who has been in the armies of the United States, and has been honorably discharged therefrom, may become a citizen on his petition, without any previous declaration of intention, provided that he has resided in the United States at least one year previous to his application, and is of good moral character. (It is judicially decided that residence of one year in a particular state is not requisite.)

Any alien under the age of twenty-one years who has resided in the United States three years next preceding his arriving at that age, and who has continued to reside therein to the time he may make application to be admitted a citizen thereof, may, after he arrives at the age of twenty-one years, and after he has resided five years within the United States, including the three years of his minority, be admitted a citizen; but he must make a declaration on oath and prove to the satisfaction of the court that for two years next preceding it has been his bona fide intention to become a citizen.

The children of persons who have been duly naturalized, being under the age of twenty-one years at the time of the naturalization of their parents, shall, if dwelling in the United States, be considered as citizens thereof.

The children of persons who now are or have been citizens of the United States are, though born out of the limits and jurisdiction of the United States, considered as citizens thereof.

The naturalization of Chinamen is expressly prohibited by section 14, chapter 126, laws of 1882.

Section 2,000 of the revised statutes of the United States declares that "all naturalized citizens of the United States while in foreign countries are entitled to and shall receive from this government the same protection of persons and property which is accorded to native-born citizens."

The right to vote comes from the state, and is a state gift. Naturalization is a federal right and is a gift of the Union not of any one state. In nearly one-half of the Union aliens (who have declared intentions) vote and have the right to vote equally with naturalized or native-born citizens. In the other half only actual citizens may vote. The federal naturalization laws apply to the whole

Union alike, and provide that no alien may be naturalized until after five years' residence. Even after five years' residence and due naturalization he is not entitled to vote unless the laws of the state confer the privilege upon him, and he may vote in several states six months after landing, if he has declared his intention, under United States law, to become a citizen.

The inhabitants of Hawaii were declared to be citizens of the United States under the act of 1900 creating Hawaii a territory. Under the United States supreme court decision in the insular cases, in May, 1901, the inhabitants of the Philippines and Porto Rico are entitled to full protection under the constitution, but not to the privileges of United States citizenship until congress so decrees, by admitting the countries as states or organizing them as territories.

NATURAL PHILOSOPHY, originally the study of nature in general; but now commonly restricted to the various sciences classed under Physics.

NATURAL SELECTION, a phrase frequently employed in connection with Darwin's theory of the origin of species, to indicate the process in nature by which plants and animals best fitted for the conditions in which they are placed survive, propagate, and spread, while the less fitted die out and disappear; this process being combined with the preservation by their descendants of useful variations arising in animals or plants. Mr. Darwin's theory takes origin from the fact that all species vary to a greater or less extent. These variations, through particular or "selected" members of the species, become perpetuated. What was at first a mere individual variation becomes in this way and through transmission a perpetuated "variety" or a "race." These "races" are subject to a similar process of variation, and varieties of the race may in turn appear; and thus through the variety we in time arrive at forms which present characters so widely different from those of the original species that they may be regarded structurally and functionally as new species. In the domestication and breeding of cattle and sheep, in the numerous varieties of dogs, pigeons, and other animals, man, it is believed, through artificial selection, has imitated nature in her process, and has produced varieties or breeds which differ widely from the original stock or specific type.

NATURAL THEOLOGY is that department of ethics which deals with those propositions relating to the existence and attributes of God and the duty of man which can be demonstrated by human reason, independent of written revelation.

NATURE PRINTING is the art of giving an exact reproduction of natural objects by printing from impressions of the objects themselves formed by pressure on metallic plates. The only objects to which the art can be applied with success are those with tolerably flat surfaces, such as dried and pressed plants, especially ferns and seaweeds, embroidery and lace, the grain of wood, etc. In one method the object is placed between a plate of copper and one of lead, when a perfect intaglio impres-

sion is made on the leaden plate, from which an electrotpe is taken, and from this the impressions are taken.

NAUGATUCK, a town in New Haven co., Conn., on the Naugatuck river, and on the Naugatuck Division of the N.Y., N.H. and Hart. Railroad; 5 miles s. of Waterbury. Its manufactures include rubber and woollen goods, malleable iron, paper boxes, pins, buttons, belting, and electro-plated ware. Pop. 12,421.

NAU'SEA, the sensation of sickness, or inclination to vomit, similar to that produced by the motion of a ship at sea. Though the feeling is referred to the stomach, it frequently originates in disorder of other and remote parts of the body, such as the brain, kidney, womb, etc.

NAUTILUS, a genus of cephalopods with polythalamous or many-chambered shells. The shell of the pearly nautilus is a spiral with smooth sides. The turns or whorls are contiguous, the outer whorl covering the inner. The chambers of the shell are separated by transverse septa, and one after the other have been the residence of the



Nautilus shown in section.

animal, being successively abandoned as it has grown. The animal thus always resides in the cavity of its outermost or external chamber. A siphuncle connects the body with the air-chambers, passing through each transverse septum till it terminates in the smallest chamber at the inner extremity of the shell. These internal chambers contain only air. By means of the siphuncle the animal is enabled to sink itself or to swim. The nautilus is an inhabitant of the tropical seas. Only three or four existing species are known, though the fossil species exceed a hundred. The name is often loosely applied to the shells of different genera of mollusca. The animal which has been said to sail in its shell upon the surface of the water is the paper-nautilus or argonaut. See Argonaut.

NAVAJO INDIANS (ná-vá'hō), a tribe of American Indians numbering about 12,000, many of whom are engaged in civilized pursuits. They occupy a reservation in the n.w. of New Mexico and the n. e. of Arizona.

NAVAL ACADEMY UNITED STATES, the school situated at Annapolis, Md., founded in 1845 at which are educated the executive officers of the United States navy.

The students of the naval academy are called midshipmen. Two midshipmen are allowed for each senator, representative, and delegate in congress, two for the district of Columbia, and five each year from the United States at large. The appointments from the district of Columbia and five each year at large are made by the president. One

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midshipman is allowed from Porto Rico, who must be a native of that island. The appointment is made by the president, on the recommendation of the governor of Porto Rico. The congressional appointments are equitably distributed, so that as soon as practicable each senator, representative, and delegate in congress may appoint one midshipman during each congress. The course for midshipmen is six years—four at the academy, when the succeeding appointment is made, and two years at sea, at the expiration of which time the examination for graduation takes place. Midshipmen who pass the examination for final graduation are appointed to fill vacancies in the lower grade of the line of the navy and of the marine corps, in the order of merit as determined by the academic board of the naval academy. Candidates allowed for congressional districts, for territories, and for the district of Columbia must be actual residents. Candidates at the time of their examination must be physically sound, well formed, and of robust constitution. Attention will also be paid to the stature of the candidate, and no one manifestly under size for his age will be received at the academy. The height of candidates for admission shall not be less than 5 feet 2 inches between the ages of 16 and 18 years, and not less than 5 feet 4 inches between the ages of 18 and 20 years; and the minimum weight at 16 years of age shall be 100 pounds, with an increase of not less than 5 pounds for each additional year or fraction of a year over one-half. Any marked deviation in the relative height and weight to the age of a candidate will add materially to the consideration for rejection. Candidates must be unmarried, and any midshipman who shall marry, or who shall be found to be married, before his final graduation, shall be dismissed from the service. All candidates must, at the time of their examination for admission, be between the ages of 16 and 20 years. The pay of a midshipman is \$500, beginning at the date of admission.

NAVAL CADETS. See Naval Academy.

NAVAL HOSPITALS. See Hospital.

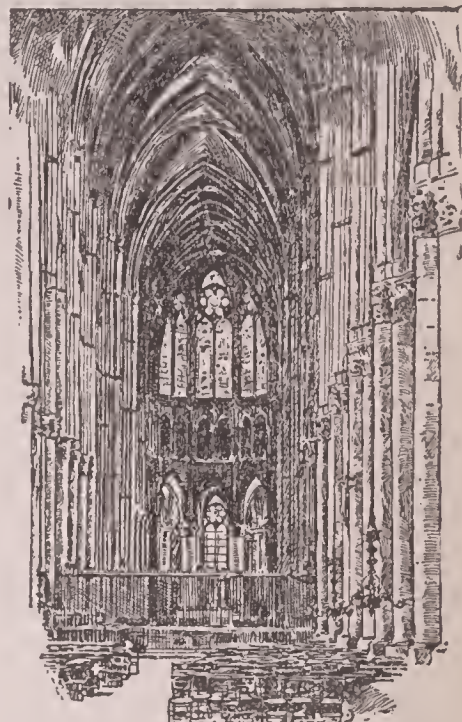
NAVARE, a former kingdom, now a province of Spain, between Aragon, Old Castile, and Biscay; area, 4045 sq. miles; pop. 321,015.

NAVE, in Gothic architecture, that part of a church extending from the western entrance to the transept, or to the choir and chancel, according to the nature and extent of the church.

NAVEL, or **UMBILICUS**, the aperture or passage in the abdomen which in the adult is normally closed, but in the foetus or embryo gives passage to the umbilical vessels, by means of which the foetus communicates with the parent through the placenta. The cicatrization or healing of the navel produces the contracted and depressed appearance so familiar in the external aspect of the structure.

NAVIGATION, the science or art of conducting ships or vessels from one place to another. The management of the sails, rudder, etc., or the working of the ship generally, though essential to the practice of navigation belongs

rather to seamanship, navigation being more especially the art of directing and measuring the course of ships, the method of determining their position, etc., by the laws of geometry, or by astronomical principles and observations. In order to the accomplishment of this the ship must be provided with accurate charts of seas, plans of ports and harbors, etc., compasses, chronometer, sextant, log and log-line, various mathematical instruments, leads and



Nave—Rheims cathedral, France; 13th century.

lead-lines, log-book, etc. It is by the compass that the direction in which the ship sails or should sail is determined. Though it points in a northerly direction, it does not generally point to the true north, but has a certain variation which must be taken into account. The rate of speed at which a vessel is sailing is found by means of the log, which is heaved usually at the end of every hour. By noting the rate of sailing, the direction of the course, and the time occupied, the ship's position may be estimated, allowance being made for deviation caused by currents, and by the wind driving the vessel to leeward. The position thus determined is said to be found by dead-reckoning. It is not safe to trust to dead-reckoning for any length of time, and a more accurate method of finding the vessel's position at any time is required. This consists in taking observations of the heavenly bodies with the sextant, and these being compared with data given in the Nautical Almanac, while correct Greenwich time is given by the chronometer, the latitude and longitude, or true position, is easily found. In navigating a ship a certain knowledge of trigonometry is required; but the operations can be much shortened by tables and instruments. In directing a ship's course, and applying it on a chart, several methods of what are called sailings are employed, as plane sailing (the earth being regarded as having a plane surface), Mercator's

sailing, great circle sailing (sailing on a great circle of the sphere), etc.

NAVIGATION LAWS are based upon the right of a state to regulate the navigation of its own waters and to protect its own commerce, and may be divided into two classes.

The first class includes all those laws, once so numerous, designed to secure a commercial monopoly to the state which enacted them. Any advantages which a British ship has, e.g., the right of claiming protection for her flag, the non-attachment to her of a maritime lien for necessities supplied in a British port, are not directly connected with the policy under which the navigation acts have become obsolete. These advantages are not secured to a British ship until she is registered. American law agrees with British in this respect. The United States have imitated the policy of England and other commercial nations in conferring peculiar privileges upon American-built ships and owned by our own citizens. The object of the registry acts is to encourage our own trade, navigation, and ship-building by granting peculiar or exclusive privileges of trade to the flag of the United States, and by prohibiting the communication of those immunities to the shipping and mariners of other countries. It may be noticed that an alien is generally incapable of becoming the owner of a ship. This incapacity is specially preserved in the case of British ships by the naturalization act, 1870.

The second class of navigation laws includes those which deal with the navigation of any waters over which a state has any control, and embraces all that is necessary for the due use of such waters, as rules of the road, management of harbors and lighthouses, and licensing and control of pilots. Such laws may deal with (1) the high seas, (2) tidal waters other than the high seas (3) non-tidal waters.

NAVIGATOR'S ISLANDS. See Samoa.

NAVY, the ancient method of naval warfare consisted, in great part, in the driving of beaked vessels against each other; and therefore skill and celerity in manœuvring, so as to strike the enemy at the greatest disadvantage, were of the utmost importance. This mode of conflict has been attempted to be revived at the present time, and vessels called "steam-rams" are specially constructed for this species of conflict. The earliest powers having efficient fleets appear to have been the Phœnicians, Carthaginians, Persians, and Greeks; the Greeks had fleets as early as the beginning of the 7th century B.C.—the first sea-fight on record being that between the Corinthians and their colonists of Corcyra, 664 B.C. The earliest great battle in which tactics appear to have distinctly been opposed to superior force, and with success, was that of Salamis (480 B.C.), where Themistocles, taking advantage of the narrows, forced the Persian fleet of Xerxes to combat in such a manner that their line of battle but little exceeded in length the line of the much inferior Athenian fleet. The Peloponnesian War, where "Greek met Greek," tended much to develop the art of naval warfare. But the destruc-

tion of the Athenian marine power in the Syracusan expedition of 414 B.C., left Carthage mistress of the Mediterranean. The Roman power, however, gradually asserted itself, and after two centuries, became omnipotent by the destruction of Carthage. For several following centuries, the only sea-fights were occasioned by the civil wars of the Romans. Toward the close of the empire, the system of fighting with pointed prows had been discontinued in favor of that which had always co-existed—viz., the running alongside, and boarding by armed men, with whom each vessel was overloaded. Onagers, balistæ, etc., were ultimately carried in the ships, and used as artillery; but they were little relied on, and it was usual, after a discharge of arrows and javelins, to come to close quarters. A sea-fight was therefore a hand-to-hand struggle on a floating base, in which the vanquished were almost certainly drowned or slain.

The northern invaders of the empire, and subsequently the Moors, seem to have introduced swift-sailing galleys, warring in small squadrons and singly, and ravaging all civilized coasts for plunder and slaves. This—the break-up

of the Spanish navy, which, by the epoch of Columbus, had a rival in that of Portugal. Many struggles, left in the 16th and 17th centuries, the principal naval power in the hands of the English, French, Dutch, Spaniards, and Portuguese.

Dating the modern navies of the world from the 16th century, we find the British navy rising from insignificance by the destruction of the Spanish Armada in 1588; a blow which Spain never recovered, and which the Dutch whose naval force had acquired tremendous strength in their struggle for independence, increased the weight of, by their triumph in 1607, in the Bay of Gibraltar. At this time there was no decisive superiority of the fleet of England over that of France; but each was inferior to the Dutch navy. The Commonwealth and reign of Charles II. was signalized by the struggle for mastery between the English and Dutch; when victory, after many alternations, finally sided with the former. Through the 18th century, the English and French were the principal fleets; but Louis XVI. gave a decided superiority to the navy of France; and at the period of the American war, the

Order of Rank	Powers	1st Class Battleships	2d and 3d Class Battleships	Coast Defense Ships	Armored Cruisers	Protected or 1st Class Cruisers	Other Cruisers (2d and 3d Class)	Sea-Going Gunboats	River Gunboats	Torpedo Boat Destroyers	Torpedo Boats	Transports, Hospital, Special Service, Ships, Tugs, Etc.	Subsidized and Auxiliary Ships	School and Training Ships	Officers	Men
1	Great Britain.....	49	20	7	37	30	119	98	18	184	290	386	70	30	6,756	96,492
2	France.....	23	19	8	19	37	14	38	30	41	329	219	27	11	3,590	52,193
3	United States.....	28	1	22	12	22	16	11	31	10	†41	103	15	5	2,257	32,211
4	Germany.....	18	11	6	12	19	17	30	12	43	86	116	22	17	2,719	33,820
5	Japan.....	†18	8	13	13	29	38	23	18	43	87	99	63	7	2,869	30,490
6	Italy.....	9	11	4	7	11	23	19	3	19	141	87	9	4	1,560	25,800
7	Russia.....	8	11	12	5	6	22	10	11	68	192	67	69	10	2,600	50,000
8	Austria-Hungary....	1	15	7	3	4	12	15	4	3	80	27	3	3	868	11,000
9	Chile.....	2	2	1	3	2	2	2	1	18	26	26	2	2	660	7,290
10	Turkey.....	13	1	1	1	5	12	1	4	27	21	15	1	585	6,870	
11	Greece.....	4	1	1	1	4	8	1	2	44	15	48	4	361	6,426	
12	Denmark.....	10	1	1	1	1	3	9	8	31	27	27	3	3	640	7,612
13	Sweden.....	1	7	1	2	1	3	9	8	2	31	27	3	3	830	25,000
14	Netherlands.....	8	15	1	1	9	5	34	44	92	11	11	2	270	4,360	
15	Norway.....	1	7	6	1	7	5	12	16	2	38	9	2	749	5,892	
16	Spain.....	4	1	1	4	3	31	9	20	5	14	20	10	7	420	5,000
17	Brazil.....	5	5	2	4	4	6	13	1	22	13	3	1	464	4,826	
18	Argentine Republic..	3	2	6	3	4	10	21	21	41	17	1	1	280	3,200	
19	Portugal.....	3	1	3	1	3	21	20	21	41	17	1	1	181	2,000	
20	English Colonies.....	9	7	14	16	13	14	16	14	11	2	300	5,400			
21	China.....	3	15	13	14	14	11	11	11	11	11	142	1,245			
22	Peru.....	3	5	3	5	3	5	3	5	3	5	149	1,390			
23	Mexico.....	1	9	7	7	7	7	7	7	7	7	80	600			
24	Colombia.....	7	7	7	7	7	7	7	7	7	7	230	920			
25	Belgium.....	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7

* Includes captured vessels from Spain. † Includes scout vessels. ‡ Includes captured Russian vessels.

of the empire—was the era of piracy, when every nation, which had more to win than lose by freebooting, sent out its cruisers. Foremost for daring and seamanship were the Norsemen who penetrated in every direction from Bosphorus to Newfoundland. Combination being the only security against these marauders, the medieval navies gradually sprang up; the most conspicuous being—in the Mediterranean, those of Venice, Genoa, Pisa, Aragon; on the Atlantic sea-board, England and France. In the Mediterranean, Venice, after a long struggle with the Genoese, and subsequently with the Turks, became the great naval power. The Aragonese fleet gradually developed into

naval power of England was seriously threatened. Spain, Holland, and Russia (now for the first time a naval power) had meanwhile acquired considerable fleets; and the "armed neutrality," to which the northern powers gave their adherence, rendered the British position most critical.

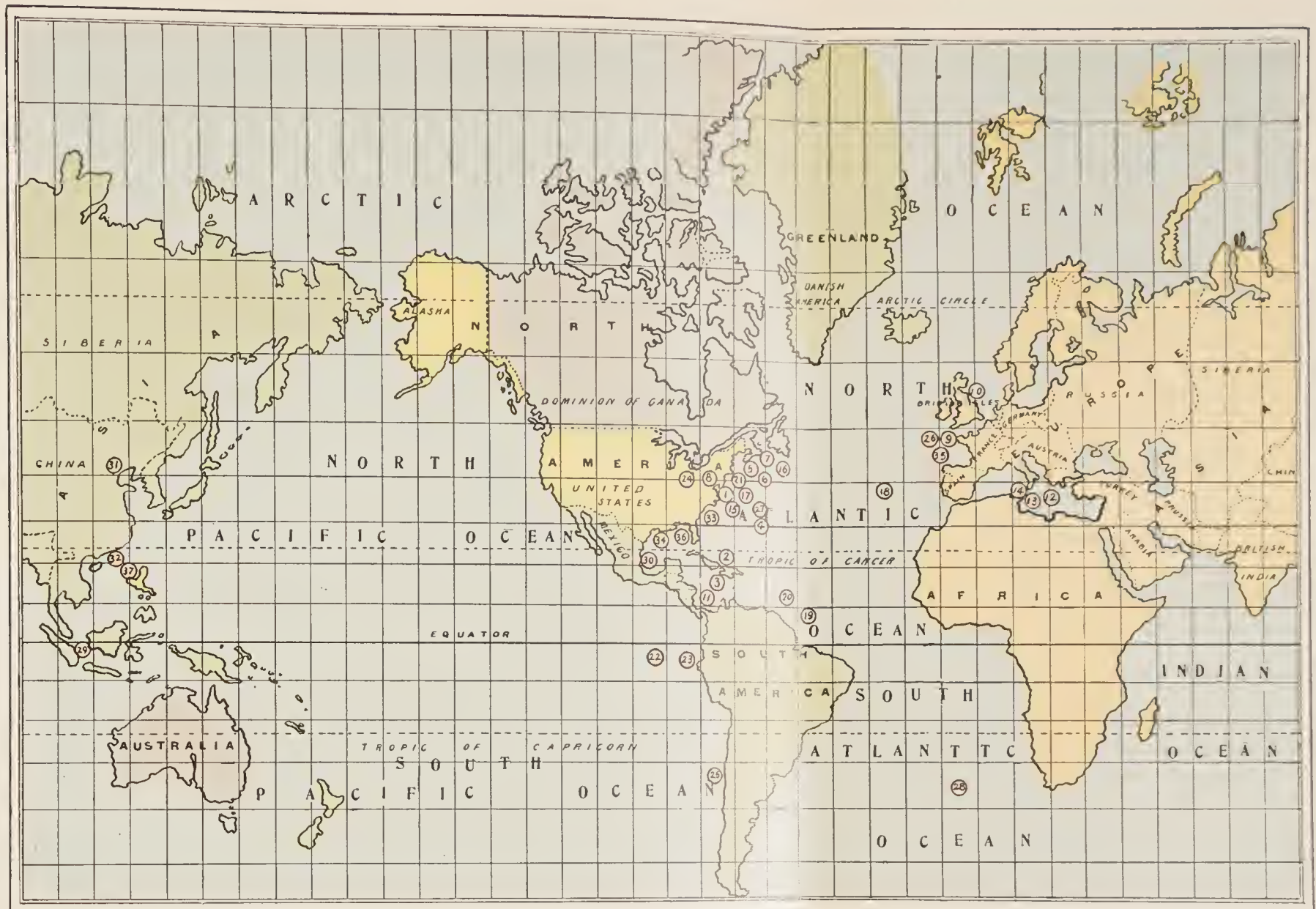
Camperdown broke the Dutch power; many battles weakened the French navy; and at Trafalgar, in 1805, it, with the Spanish power, was swept from the ocean. The United States had in the meantime augmented their fleet, and in the war of 1812-1814, maintained a glorious struggle. During the American war of secession, many gun-boats, "monitors," and ironclads of all classes,



WORLD'S GREATEST BATTLESHIP.

The Delaware, launched in January, 1909, at Newport News, Va., for the United States navy, will be of 20,000 tons with a water line length of 510 feet and a breadth of 85¼ feet. She will have a speed of 21 knots, constructed to be practically unsinkable. The main batteries will include ten 12-inch guns and their broadside fire will be 25 per cent greater than that of Great Britain's Dreadnaught, capable of piercing 2 feet of the best existing armor; in other words, a ship that would have no trouble in destroying anything now afloat or yet designed. Its engines will generate an energy that could draw 1,200 railway cars, stretching over 6 miles, at the rate of 30 miles an hour and loaded with an army of 36,000 men.

HOW AMERICAN SHIPS HAVE FOUGHT AROUND THE WORLD.



- 1—BRITISH SHIP GASPE SUNK OFF PROVIDENCE, R. I., JUNE 17, 1772.
- 2—BRITISH BRIG RACEHORSE CAPTURED OFF PORTO RICO, JULY 6 1776.
- 3—BATTLE BETWEEN AMERICAN BRIG REPRISAL AND BRITISH SLOOP SHARK, OFF MARTINIQUE, SUMMER OF 1776.
- 4—PAUL JONES ON AMERICAN BRIG PROVIDENCE FOUGHT BRITISH FLEET OF 5 VESSELS OFF BERMUDAS, SEPT. 1, 1776.
- 5—PAUL JONES OFF NOVA SCOTIA, SEPT. 1775.
- 6—PAUL JONES OFF NOVA SCOTIA, SEPT. 22, 1776.
- 7—PAUL JONES OFF CAPE BRETON, NOV. 2, 1776.
- 8—BATTLE OF LAKE CHAMPLAIN, OCTOBER, 1776.
- 9—AMERICAN BRIG LEXINGTON CAPTURED IN ENGLISH CHANNEL, SEPT. 20, 1777.
- 10—PAUL JONES ON THE BON HOMME RICHARD DEFEATS BRITISH BRIG SERAPIS OFF SCARBOROUGH, ENG., SEPT. 23, 1779.
- 11—CONSTITUTION CAPTURED FRENCH FRIGATE INSURGENT OFF ST. KITT'S, FEB. 9, 1799.
- 12—ENTERPRISE CAPTURED BARBARY PIRATE TRIPOLI OFF ISLAND OF MALTA, AUG. 1, 1801.
- 13—PHILADELPHIA CAPTURED BARBARY PIRATE OFF TRIPOLI, OCT. 31, 1803.

- 14—DECATUR DEFEATS BARBARY PIRATES OFF SYRACUSE ISLAND OF SICILY, DEC. 23, 1803.
- 15—AMERICAN SHIP CHESAPEAKE FIGHTS BRITISH 50-GUN SHIP LEOPARD OFF NORFOLK, VA., JUNE 22, 1807.
- 16—CONSTITUTION SUNK THE GUERRIERE OFF GULF OF ST. LAWRENCE, AUG. 19, 1817.
- 17—WASF CAPTURED BRITISH SLOOP FROLIC OFF CAPE VERTERAS, OCT. 18, 1812.
- 18—UNITED STATES FIGHTS BRITISH SHIP MACEDONIAN BETWEEN AZORES AND CANARIES, OCT. 25 1812.
- 19—CONSTITUTION SUNK BRITISH SHIP JAVA OFF COAST OF BRAZIL, DEC. 29, 1812.
- 20—HORNET WHIPPED BRITISH SHIP PEACOCK OFF COAST OF SOUTH AMERICA, FEB. 24, 1813.
- 21—CHESAPEAKE SUNK BY BRITISH SHIP SRAKNOT OFF BOSTON, JUNE 1, 1813.
- 22—ESSEX CAPTURES BRITISH PRIZE OFF GALAPAGOS ISLAND, APRIL 29, 1813.
- 23—ESSEX CAPTURES BRITISH PRIZES IN OUTAQUIL BAY JUNE 19, 1813.

- 24—BATTLE OF LAKE ERIE, SEPT. 10, 1813.
- 25—ESSEX SUNK OFF VALPARAISO, CHILE, MARCH 28, 1814.
- 26—WASF CAPTURED BRITISH SHIP REINDEER IN ENTRANCE TO ENGLISH CHANNEL, JUNE 28, 1814.
- 27—PRESIDENT CAPTURED OFF JERSEY COAST, JAN. 18, 1815.
- 28—AMERICAN SHIP HORNET CAPTURED BRITISH SHIP PENGUIN, OFF TRISTAN D'ACUNHA, MARCH 23, 1815.
- 29—AMERICAN SHIP FRIENDSHIP CAPTURED BY NATIVE PIRATES OFF COAST OF SUMATRA, FEB. 7, 1831; NATIVES FURNISHED IN 1838.
- 30—BOMBARDMENT OF VERA CRUZ, OCTOBER, 1846.
- 31—BOMBARDMENT OF PEIHO RIVER PORTS, JULY 29, 1854.
- 32—BOMBARDMENT OF CANTON PORTS, NOV. 15, 1854.
- 33—CONFEDERATE MERRIMAC SUNK U. S. FRIGATE CUMBERLAND IN HAMPTON ROADS, MARCH 8, 1862. BATTLE BETWEEN MERRIMAC AND MONITOR, MARCH 9, 1862.
- 34—BATTLE OF NEW ORLEANS, APRIL 24, 1862.
- 35—KEARSARGE SUNK THE ALABAMA OFF CHERBOURG, FRANCE, JUNE 19, 1864.
- 36—BATTLE OF MOBILE, AUG. 5, 1864.
- 37—BATTLE OF MANILA, MAY 1, 1898.



THE UNITED STATES NAVY

This assemblage of fighting ships, second only to Great Britain, includes all in commission up to November, 1907. The fleet consists of 27 Battleships, 12 Armored Cruisers, 22 Protected Cruisers, 10 Monitors, 49 Gunboats, 57 Torpedo Boats, 12 Submarine Boats—189. In process of construction, 28—the greatest aggregate fighting power now being added to the navy of any one of the great powers, as follows, 13 First-class Battleships, 8 Armored Cruisers, 7 Protected Cruisers. Total, 217 fighting machines.

NAVAL FORCE OF THE WORLD

EACH NATION'S PERCENTAGE OF THE TOTAL STRENGTH





MODERN FLOATING FORTRESS.

The globuloid naval battery *Ultima*, designed by Anson Phelps Stokes, length 270 feet; breadth, 190 feet; displacement, 30,000 tons; horse power, 14,000. Two 16-inch and sixteen 12-inch guns form the main battery and fifty other guns of 3 inches. The vessel is supposed to be impregnable to gun fire, ramming and torpedo attack and is intended to serve as a mother ship for sheltering submarines. Every shot fired from the 16-inch gun costs approximately \$1,000. The range is over 20 miles, fitted with sights that make it possible to train a gun upon a target invisible to the naked eye.

were created; but chiefly adapted for river and coast service. The Emperor Napoleon III. greatly enlarged and improved the French navy, yet in the war of 1870-1871 it had no opportunity of proving its effectiveness.

The contest between the attack and defense which has been going on for some time, appears to have attained its limits in the 100-ton guns of the Italian navy, and the 24-inch armor-plate of the British; and a new departure seems already to have been taken which points in the direction of steel-plates and speed, and a more special adaptation of ships for particular services. The torpedo system has introduced a new element into naval warfare, particularly in harbors, rivers, and inland waters, which can hardly be said to be yet fully developed; and the catastrophes of the Vanguard of the British navy, and the Grosser Kurfürst of the German, have pointed out dangers connected with the ram system that had not been calculated upon.

The table on page 866 gives the comparative strength of the chief navies of the world.

NAVY, The New American. The Indiana, Massachusetts and the Oregon were the first battleships rated as first-class built for the American navy—the Maine and Texas authorized in 1886 being rated as only second class. The three were sister ships, each having a displacement of 10,288 tons, and each carrying four 13-inch guns, eight 8-inch guns and four 6-inch guns in their main batteries. The Oregon was built on the Pacific coast, in pursuance of a policy adopted by congress in 1888, of having a part of the new ships for the navy constructed on the west coast. The Indiana and Massachusetts played important parts in the naval operations in Cuban waters during the war with Spain in 1898. The Oregon earned worldwide fame by its remarkable cruise of 10,800 miles, from San Francisco to Jupiter Inlet, Florida, around Cape Horn. It was the most notable voyage ever undertaken by a battleship of its class in the history of modern navies.

In 1891 congress provided but for one addition to the navy—the protected cruiser Minneapolis—a sister ship of the commerce destroyer Columbia. In 1893, however, congress added the armored cruiser Brooklyn and the first-class battleship Iowa to the navy. Both ships represented a distinct advance in naval construction. The Brooklyn was larger and more heavily armed than the New York, the only armored cruiser in the navy at that time, while the Iowa had a displacement of 11,340 tons as against the 10,288 tons of the Indiana, Massachusetts, and Oregon. Both ships rendered valuable service in the Spanish-American war. The Brooklyn was the flagship of Rear Admiral Schley, second in command at the battle of Santiago, and was hit oftener by Spanish shells than any other American vessel in the engagement. The Iowa took part in the same battle.

Three gunboats, the Helena, Nashville, and Wilmington, and a submarine torpedo boat, the Plunger, were authorized by congress in 1893. The Nashville

fired the first hostile shot in the war with Spain, capturing the Spanish ship Bonaventura on the morning of April 22, 1898, only a few hours after war was declared and while Sampson's fleet was on its way from Key West to begin the blockade of Havana. Congress in 1894 authorized only the construction of three torpedo boats, the Foote, Rodgers and Winslow. The Winslow won distinction in the Spanish-American war in the action at Cardenas on May 11, 1898. The Winslow had entered the bay to assist in cable cutting operations and came under range of the Spanish shore batteries. Ensign Worth Bagley and four sailors were killed, this being the first American blood shed by the Spaniards in the war.

The congress of 1895 made a notable increase in the navy, providing for the construction of no less than eleven vessels, including two first-class battleships, six gun boats and three torpedo boats. The battleships were the sister ships Kentucky and Kearsarge and offered a radical departure from any type of battleship ever before constructed in any navy. Both were supplied with superimposed turrets—a pair of 13-inch guns in the lower turret and a pair of 8-inch guns in a smaller turret mounted upon the larger turret. The gunboats provided in the same naval program were the Annapolis, Marietta, Newport, Princeton, Vicksburg, and Wheeling. They are all small cruising vessels, each of 1000 tons displacement, built for West Indian and Caribbean sea service. The torpedo boats included the Dupont, Porter and Roman.

Congress in 1896 added the three first-class battleships Alabama, Illinois, and Wisconsin, and ten torpedo boats, and in 1897 three more torpedo boats and a training ship to the navy. In 1898, the naval program was the largest ever authorized at a single session of congress. The list included three first-class battleships larger than any before designed for the American navy, sixteen torpedo boat destroyers—the first ever built by the United States, twelve torpedo boats, four coast defense monitors and one gunboat. The Spanish-American war undoubtedly was the direct moving cause of this generous expansion of the navy. The war had demonstrated the fact that the United States could not claim immunity from war with a foreign power and that the naval combats of the future were to be fought with first-class battleships.

The additions to the navy authorized in 1898 were three first-class battleships, the West Virginia, Nebraska, and Georgia, three great armored cruisers, the California, Pennsylvania and Virginia, and six protected cruisers, and in 1900 provided for two more first-class battleships, the New Jersey and Rhode Island, three armored cruisers, the South Dakota, Maryland and Colorado, three protected cruisers of a new and advanced type, the Charleston, Milwaukee and St. Louis, each of 9,700 tons displacement.

Congress in 1900 also made a new departure in naval construction by providing for seven submarine torpedo boats.

Two first-class battle-ships, the Connecticut and the Louisiana, two armored cruisers, the Tennessee and Washington, two gunboats, the Dubuque and Paducah, were added in 1902. The congress of 1903 authorized no less than five first-class battleships of 16,000 tons displacement each, the equals of any fighting ships afloat in any navy. In 1904 a first-class battleship and three swift cruisers were added to the navy, and in 1905 two more first-class battleships were added.

No limit has been fixed by naval authority, congressional action, or public sentiment. The general naval board at the head of which stands Admiral Dewey is on record officially as stating that the work of construction should continue without interruption until at least 48 first-class battleships and 48 first-class armored cruisers of the heaviest class and highest type should be in commission.

NAVY, ARMY AND, RELATIVE RANK IN THE UNITED STATES.

Generals rank with admirals, lieutenant-generals rank with vice-admirals, major-generals rank with first nine rear-admirals, brigadier-generals rank with rear-admirals after the first nine and commodores, colonels rank with captains, lieutenant-colonels rank with commanders, majors rank with lieutenant-commanders, captains rank with lieutenants, first lieutenants rank with lieutenants junior grade, second lieutenants rank with ensigns, cadets rank with midshipmen.

NAVY, Department of the, one of the nine executive departments of the United States government, created by act of congress of April 30, 1798, and charged with the general control and administration of the navy. At the head of the department is a secretary, who is a member of the cabinet, appointed by the president with the advice and consent of the senate, and receives an annual salary of \$3000.

It is his duty to execute such orders as the president may give relative to the administration of naval affairs, including the procurement of naval supplies and the construction, armament, equipment, and employment of vessels of war. He makes annual report to the president of the operations of the navy department. His deputy is the assistant secretary, who is appointed by the president, and who during the absence or incapacitation of the secretary acts in his stead, taking the title of acting secretary.

NAVY-YARDS. 1. Brooklyn navy-yard, Brooklyn, N. Y., 2. Charleston navy-yard, Boston, Mass. 3. Portsmouth navy-yard, near Norfolk, Va. 4. Kittery navy-yard, opposite Portsmouth, N. H. 5. League Island navy-yard, Philadelphia, Pa. 6. Mare Island navy-yard, near San Francisco, Cal. 7. Washington City navy-yard, Washington, D. C. 8. Puget Sound navy-yard, Bremerton, Wash.

There are naval stations at Port Royal, S. C.; Charleston, S. C.; Key West, Fla.; Pensacola, Fla.; Algiers, La.; Great Lakes, North Chicago, Ill.; a torpedo and training station at Newport, R. I., and a training station on Yerba Buena Island, Cal., and the naval

War college, Newport, R. I. Naval stations have been established at Tutuila, Samoa, Island of Guam; San Juan, Porto Rico; Culebra, W. I.; Guantanamo, Cuba, Honolulu, H. I., and Cavite, Philippine islands. The latter has become an important naval base for the Asiatic squadroon.

NAZARINES, a designation given to the early Christians from the town of Nazareth, where Christ dwelt. The name was also applied to a sect which arose at the end of the 1st century, and existed chiefly in Egypt. They are supposed to have retained a judaizing adherence to the Mosaic law, and to have held a low opinion about the divinity of Christ.

NAZ'ARETH, a small town in Palestine, 65 miles north of Jerusalem, celebrated as the residence of our Savior during his youth. It is surrounded on all sides by hills. The houses are of stone, well built, with flat roofs. There is a Franciscan convent and fine church; an English mission church, school, and orphanage; a Greek church, and a mosque. Pop. about 6000.

NEBO, or **NABU**, an ancient Assyrian and Babylonian deity, lord of the planet Mercury, and ruler of the hosts of



Nebo.

heaven and earth, according to Babylonian inscriptions, especially honored in Borsippa. Statues of Nebo have been found in Nineveh, showing him with long beard and hair, and clad in a long robe.

NEBRAS'KA, one of the United States, bounded by South Dakota, Iowa, Missouri, Kansas, Colorado, and Wyoming; area, 76,855 sq. miles. It lies in the region of the great plains skirting the eastern slope of the Rocky mountains, toward whose foothills it rises in a gentle undulating incline. The whole western half of the state lies at an elevation of more than 2500 feet above the sea.

The climate is dry and exhilarating. The mean temperature for January is 19.7° and for July 74.8°. The extremes are very great, the mercury sometimes falling to -42° and at times rising to 114°. The nights are cool. The annual rainfall is 23 inches, but this is very unevenly distributed. In the east it is sufficient to support agriculture, ranging from 30 inches on the average to a local maximum as high as 50 inches. In the western half it is below 20, and in the

extreme west as low as 12 inches, so that here agriculture cannot be carried on successfully without irrigation. On the n.w. it is a desolate tract known as the Mauvaiscs Terres or Bad Lands, rich in interesting fossil remains. Timber has been extensively planted of late. The principal rivers are the Missouri, which forms the boundary on the east;



Seal of Nebraska.

its great affluent, the Nebraska or Platte, which, formed by two main forks, a northern and a southern, both from the Rocky Mountains, traverses the territory in an eastern direction; and the Republican Fork of Kansas river, traversing the southern part of the state. The soil, except in the northwest and southwest, is a deep rich loam overlaid by a porous clayey subsoil, and is thus admirably adapted to withstand drought. Nebraska ranks as one of the most important agricultural states. 60.8 per cent of the total land area is included in farms, and of this 61.6 per cent is improved. Irrigation in the arid areas of the west has been attended with success. In some regions there are supplies of underground water, which can be utilized by means of windmills and small reservoirs.

Corn is the leading crop, nearly one-half of the cultivated acreage of the state being devoted to it. The acreage devoted to wheat is about one-third that of corn and there have been large increases in the area devoted to oats and rye during each of the last two decades of the nineteenth century; rye, however, is of only minor importance. Grasses cut for hay are chiefly wild, salt, or prairie grasses, but millet, alfalfa, and other cultivated grasses are also grown. Potatoes and other vegetable crops are extensively grown. In the last decade of the past century a rapid increase was made in the cultivation of sugar beets. The growing of orchard fruits is mainly confined to the southeastern part of the state. Cattle and horses require little protection or hand feeding during winter. Manufactures are as yet generally restricted to the supply of local wants. The railway system centers in Omaha, the chief city, the Union Pacific railway passing through the state. Limestone, sandstone, and gypsum are abundant; coal is found in limited quantity; and there is a good supply of salt. The chief towns are Omaha (by much the largest) and Lin-

coln (the state capital). At the head of the educational establishments stand the State university at Lincoln, the Protestant Episcopal college in Nebraska City, and the Congregational college at Crete. In all the principal towns there are graded and high schools supported by general and local taxation, and a generous share of the public lands has been set apart for educational purposes.

Nebraska was probably first visited by Europeans in 1541, in July of which year the Spanish general and explorer Coronado penetrated from New Mexico to a country which he called Quivira, and described as lying about the fortieth parallel, and abounding in buffalo, which corresponds with the region of the Platte. About the middle of the 18th century French missionaries from Canada came to the Missouri, and still later a few traders found their way here. It constituted a portion of the Louisiana territory which was purchased by Jefferson from France in 1803. At that time Indian tribes still occupied the whole region. At some earlier period a more civilized race lived here who made pottery and skillful carvings, built houses and fortifications, and reared mounds which often contain the ashes of their dead. When Nebraska came into possession of the United States the Sioux Indians were most numerous. The Pawnees, Otoes, and Omahas were next in numbers and in importance.

The first settlement by whites was made in 1847 at Bellevue, on the Missouri, nine miles south of Omaha. Here a trading post of the American Fur company was conducted. The Mormon emigration, begun in 1847, traversed several paths, one of which lay through Nebraska, which thus became generally known throughout the country. During the overland traffic to California that commenced in 1849, depots of supply were established at Bellevue, Plattsmouth, Nebraska City, and in the interior at Fort Kearney.

The act constituting Nebraska a distinct territory, and opening its lands to settlement, was approved May 30, 1854. Its area then embraced 351,558 sq. miles, extending from the fortieth parallel to British America on the north, its eastern line connecting the Missouri river on the southeast with the Red river on the north, and its western line being the summit of the Rocky mountains. In 1861 Nebraska was shorn of its extended territory by the cutting off of portions of it to form Dakota and Colorado territories. In 1863 it was still further reduced by the formation of Idaho territory. These curtailments left Nebraska a purely prairie state. During the first five years after the organization of the territory the settlements rapidly increased along the Missouri. Great numbers who rushed to Pike's Peak in 1859 when the gold excitement was at its height, on their return, disappointed and disgusted, stopped and opened farms in the state. In 1863 the Union Pacific railroad and in 1864 the Burlington and Missouri River railroad began to sell portions of their land in Nebraska, received from the general government and this became a most potent factor

in turning a tide of emigration into the state.

At the breaking out of the civil war in 1861 the population of the territory comprised less than 30,000. Yet Nebraska furnished to the Union army during the war 3,307 officers and men.

In 1866 the legislature prepared a constitution for a state government, which a vote of the people confirmed. The first legislature under the state constitution met July 4, 1866. The bill to admit Nebraska as a state was passed over the president's veto, and proclaimed on March 1, 1867.

The first capital of Nebraska was at Bellevue. It was removed to Omaha in 1855, where it remained until Nebraska became a state, when it was taken to Lancaster, a town of half a dozen houses, whose name was then changed to Lincoln. The present state constitution was framed in 1875, and was ratified in the same year by the people. The first legislature under the new constitution met in January, 1877. The house of representatives consists of eighty-four, and the senate of thirty members; and the legislature meets biennially.

Politically Nebraska has been republican in national elections with the exception of 1896 and 1908, when it was carried by the democratic candidate, William Jennings Bryan, a resident of the state. Pop. 1,350,000.

NEBRASKA CITY, the capital of Otoe co., Nebraska, on the Missouri, about 35 miles s. of Omaha. It contains the Nebraska college (Episcopal), and the trade is active. Pop. 10,161.

NEBRASKA, University of, a co-educational state university at Lincoln, Neb., founded in 1869. It comprises the graduate school; the college of literature, science, and arts; the industrial college, the college of law; the college of medicine, the school of fine arts; and the affiliated school of music. There is also a summer session. The regents have intrusted to its charge the United States agricultural experiment station, the state museum, the botanical and geological surveys, and the superintendency of farmers' institutes. Students are admitted on examination or on certificates from accredited schools. Military drill is compulsory for first and second year male students in the college, and physical training for all first and second year woman students.

NEBUCHADNEZZAR, a king of Babylon, celebrated as the conqueror of Judah. He reigned from 604 to 561 B.C. He was the son of Nabopolassar, by whom the kingdom of Babylon was definitely made independent of the Assyrian monarchy. In the fourth year of Jehoiakim, king of Judah (605-4 B.C.), he defeated Pharaoh-Necho, king of Egypt, at Carchemish (Circesium), on the Euphrates, after which he subjugated Syria and Palestine, carrying off with him the sacred vessels of the temple and the chief Jews into captivity. He destroyed Tyre in 585, and some years later he invaded and ravaged Egypt. During the peaceful years of his reign he rebuilt in a magnificent manner Babylon and many of the other cities of the empire, and constructed vast temples, aqueducts, and palaces, whose

ruins still testify to his grandeur. His insanity and the events preceding are only known to us from the book of Daniel. Several inscriptions relating to his reign have recently been found.

NEB'ULA, pl. *Nebulæ*, in astronomy, the name given to certain celestial objects resembling white clouds, which in many cases, when observed through telescopes of sufficient power, have been resolved into clusters of distinct stars. As more and more powerful telescopes have been employed, the number of resolvable *nebulæ* has become greater and greater, and it is probable that many *nebulæ* irresolvable at present may yet be shown to be star clusters in telescopes more powerful than those now employed. On the other hand, the spectroscope has shown that many *nebulæ*, among which are several that had hitherto appeared to be well-authenticated clusters, consist, in part at least, of masses of incandescent gas. The recent researches of Sir J. Norman Lockyer render it probable that *nebulæ* include clouds of meteors, which, by their continual impact against one another, produce the heat, light, and gaseous matter that are detected by our telescopes and spectroscopes. A few of the great *nebulæ* such as those of Orion, Argo Navis, and Andromeda, are visible to the naked eye; but most are telescopic and of these upward of 5000 are now known to astronomers. *Nebulæ* have been classified as follows: (1) Resolvable *nebulæ*, and such as apparently only require instruments of increased power to resolve them into separate stars; (2) Irresolvable *nebulæ*, showing no appearance of stars; (3) Planetary *nebulæ*, so called because they slightly resemble in appearance the larger planets; (4) Stellar *nebulæ*, those having in their center a condensation of light; and (5) Nebulous stars, a bright star often seen in the center of a circular nebula, or two bright stars associated with a double nebula, or with two distinct *nebulæ* near each other.

NEBULAR HYPOTHESIS, a theory by means of which Laplace (before the existence of nebulous matter in the universe had been discovered by means of the spectroscope) accounted for those features of the solar system which must be regarded as accidental in the Newtonian philosophy. This theory supposes that the bodies composing the solar system once existed in the form of a nebula; that this had a revolution on its own axis from west to east; that the temperature gradually diminishing, and the nebula contracting by refrigeration, the rotation increased in rapidity, and zones of nebulosity were successfully thrown off in consequence of the centrifugal force overpowering the central attraction. These zones being condensed, and partaking of the primary rotation, constituted the planets, some of which in turn threw off zones which now form their satellites. The main body being condensed toward the center, formed the sun. The theory was afterward extended so as to include a cosmogony of the whole universe, and though open to certain objections, is now generally received by astronomers.

NECK, the part of the body which is between the head and the trunk, and

connects them. The bones of the neck in man, and in nearly all other mammals, are the seven cervical vertebrae.

NECKER, Jacques, French minister of finance, born at Geneva 1732 died 1804. In 1776 he received an appointment to the treasury, the direction of which he retained for five years. Malversation under the preceding reign had caused a large deficit, to which the American war made great additions. Necker endeavored to meet the exigency by loans and reforms, and above all to fund the French debt, and establish annuities under the guarantee of the state. His suppression of abuses had created him many enemies at court, and shortly after the publication of his famous *Compte Rendu*, in which he furnished a clear statement of the condition



Necker.

in which he had found things of what he had done and what he intended to do, he resigned and retired to Switzerland, where he published his *Administration of the Finances*, which had an immense circulation. In 1788 he was recalled as controller-general. The states-general were summoned to meet on the 1st of May, 1789; but not long after the advisers of the king succeeded in inducing him to give Necker his dismissal, and to order him to leave the kingdom. No sooner was his removal known than all Paris was in a ferment. The storming of the Bastille followed (July 14), and the king found himself compelled to recall the banished minister. His return to Paris resembled a triumphal procession. His first object was to restore tranquility and security of person and property. But he was not equal to the political or even the financial crisis, and resigned in September, 1790. He passed the rest of his life in Switzerland, where he occupied himself in writing political and religious treatises. Necker's daughter was the well-known Madame de Staël.

NEC'ROMANCY, the divination of the future by questioning the dead. This superstition originated in the East, and is of the highest antiquity. We find mention made of necromancy in the Scriptures, where it is strongly condemned. In the *Odyssey* Homer has made Ulysses raise the shade of Tiresias from the infernal regions. In many parts of Greece there were oracles of the dead, the origin of which is lost in the obscurity of history. Although this practice has been condemned by the Christian

Church from the very first, it has not yet entirely ceased. Modern spiritualism embodies all the elements of necromancy. The term is often extended so as to include the general art of magic.

NECROPOLIS (literally, "city of the dead"), a name originally applied to a suburb of Alexandria devoted to the reception of the dead, and hence extended to the cemeteries of the ancients generally. The name has also been given to some modern cemeteries in or near towns.

NECROSIS (literally, "mortification"), a medical term signifying the death of the bone substance. It is a condition of the bone substance corresponding to what gangrene is in the soft parts, thus distinguished from caries, which corresponds to ulceration in the soft parts. Necrosis is usually a result of inflammation of the bone, and is often attributed to cold, but frequently it is due to constitutional disease.

NECTAR, in Greek mythology, the drink of the gods, which was imagined to contribute much toward their eternal existence. It was said to impart a bloom, a beauty, and a vigor which surpassed all conception, and together with ambrosia (their solid food) repaired all the decays or accidental injuries of the divine constitution.

NECTARINE, a fruit which differs from the peach only in having a smoother rind and firmer pulp, being indeed a mere variety of peach. See Peach.

NEEDLE, a small instrument of steel, pointed at one end, and having an eye or hole in it through which is passed a thread, used for sewing. From very ancient times needles of bone, ivory, wood, and bronze, have been used. The manufacture of steel needles was first introduced into England in the reign of Elizabeth. The operations that an ordinary sewing-needle goes through are very numerous, though of late many improvements have been introduced which reduce the number of separate operations, and many of the needle-making processes are performed by machinery at a great saving of time and labor. The chief of the ordinary operations that a sewing-needle goes through in their proper order are such as follow: The cutting of the steel wire into lengths sufficient for two needles; the pointing of these at both ends on a grindstone by fifty or sixty at a time; the cutting of each length through the middle to give two needles; the flattening of the heads by a blow with a hammer; the piercing of the eyes with a punch applied first on one side then on the other; the trimming of the eyes; the grooving and rounding of the head; hardening, tempering, straightening; polishing, which is done by making up some 500,000 needles into a cigar-shaped bundle along with emery and oil and rolling them backward and forward under a weight. Modifications of the ordinary sewing-needle are used in the various forms of sewing machines, in sailmaking, book-binding, glove-making, darning, stay-making, etc. The name is also applied to implements of iron or steel, bone, wood, etc., used for interweaving or interlacing a thread or twine in knitting, netting, embroidery, jacquard-loom

weaving, etc., and formed in various ways, according to the purpose for which they are intended; as also to sundry long and sharp-pointed surgical instruments, some employed for sewing, others for other purposes, as in couching for cataract. The small piece of steel pointed at both ends and balanced on a pivot, as in the magnetic compass and some forms of telegraphic instruments is also called a needle, and the term is used for various other objects.

NEEDLE-GUN, a breech-loading rifle the cartridge of which contained a small quantity of detonating powder which was exploded by the rapid darting forward of a needle or small spike. It is now superseded by weapons of superior efficiency. See Rifle.

NEGATIVE, in photography, is that kind of photographic picture in which the lights and shadows of the natural object are transposed; the high lights being black, and the deep shadows transparent, or nearly so. Negatives are taken on glass and paper by various processes, and should indicate with extreme delicacy, and in reverse order, the various gradations of light and shade which occur in a landscape or portrait. A negative differs from a positive inasmuch as in the latter case it is required to produce a deposit of pure metallic silver to be viewed by reflected light; while in the former, density to transmitted light is the chief desideratum; accordingly inorganic reducing and retarding agents are employed in the development of a positive, while those of organic origin are used in the production of a negative. The possession of favorable conditions of well-directed light being secured, all that is necessary is to establish a proper and harmonious relation between the collodion bath, developer, and time of exposure. A recently-iodized collodion will generally be tolerably neutral, in which case, if the developer be at all strong, and the weather warm, the bath should be decidedly acid or fogging will be the result. Should the collodion, however, be red with free iodine, a mere trace of acid in the bath will suffice, while the development may be much prolonged, even in warm weather, without fogging. If the simple fact be borne in mind that the presence of acid either in the bath collodion or developer, retards the reducing action of the developer, it will suffice to guide the operator in many difficulties. The value of a negative consists in the power it gives of multiplying positive proofs.

NEGLECT, in law, the omission to do that which ought to be done. When such want of care results in injury to another, or involves a wrong done to society, it renders the party guilty of negligence liable to either an action for damages or trial for misdemeanor. In law there are recognized three degrees of negligence: ordinary, the want of ordinary care or diligence; slight, the want of great care or diligence and gross, the want of slight care or diligence. The person charged with negligence must have been under an obligation to exercise care or diligence either assumed by contract or imposed by law. An alleged act of negligence must always

be the proximate cause of the injury sustained; but any injury caused to a person by another who at the time is exercising due care is not actionable. The question of negligence is usually one for a jury, and the onus of proof rests on the pursuer, except when the thing resulting from the negligence speaks for itself.

NEGRI'TOS, or **NEGRILLOS**, the name given to several negro-like races inhabiting the islands, etc., of South-eastern Asia, and often confounded with the Papuan race. The chief tribes are the Aëtas, the indigenous people of the Philippine Archipelago, still inhabiting the interior of the islands of Luzon, Negros, Panay, Mindoro, and Mindanao; the Samangs of Malacca; and the Mincopies inhabiting the Andaman Archipelago. They are dwarfish in stature, averaging from 4 feet 6 inches to 4 feet 8 inches in height; the nose small, flattened or turned up at the apex, and the hair soft and frizzled. The various tribes speak distinct and mutually unintelligible dialects.

NEGRO, the name of numerous rivers, both large and small. See Rio Negro.

NEGROES, a race of the human species indigenous to the African Soudan, though the term is often extended so as to cover all the tribes inhabiting Africa from the southern margin of the Sahara as far as the territory of the Hottentots and Bushmen, and from the Atlantic to the Indian Ocean. These tribes are all dark-colored, yellow, copper-red, olive, or dark-brown, passing into ebony-black. The typical negro, however, is described as having a black skin, woolly or crisp hair, a protuberant mouth with thick lips, nose thick and flat, thick narrow skull, flat and receding forehead, hair of the face scanty, thorax compressed, flat buttocks, long arms, knees bent outward, calves weak, and feet comparatively flat with long heels. The brain, though essentially similar to that of the white races, is not so large, averaging about 5 ounces less than that of the white man. The negro as a rule differs as much from the whites in mental as in physical characteristics, though there are many individual exceptions. He is very receptive, and in that which requires imitation he is well developed, but in that which requires independent thought he stands on a low stage. He has less nervous sensibility than the white man, and can flourish in climates fatal to the higher races, and the race does not diminish in contact with civilization. Certain negro tribes of Africa present a surprising picture of barbaric civilization from contact with Mohammedanism. The slave system has alienated great numbers of negroes from their native country mostly to America and the West India Islands, where there has been considerable intermixture of races. There are upwards of 7,000,000 negroes in the United States, many of whom hold good positions in society, as negroes also do in the West Indies and elsewhere.

NEGRO MINSTRELSY, a species of music of a quaint and simple kind, which originated among the negroes of the southern United States, and was first made popular at public entertain-

NEGROPONT

ments by E. P. Christy, the originator of the troupes of imitation negro musicians. The words of the songs are generally in broken English, and the harmony almost entirely limited to the chords of the tonic and dominant. The bones and banjo are the chief accompanying instruments.

NEGROPONT. See Eubæa.

NEGROS, an island in the Asiatic Archipelago, belonging to the Philippines, and separated from Panay by a strait about 15 miles wide. Length 130 miles, average width 24 miles; area about 3800 sq. miles. In the central mountainous part of the island are a considerable number of Negritos, but the inhabitants are chiefly Malays. Sugar is the chief product. Pop. 400,000.

NEGUS, a drink made of port or sherry wine mixed with hot water, sugar, nutmeg, and lemon-juice; so called from Colonel Negus, the inventor.

NEHEMIAH, a distinguished and pious Jew, who was born in captivity, but was made the cup-bearer of Artaxerxes Longimanus, king of Persia. He was sent, B.C. 444, as governor to Jerusalem, with a commission to rebuild the walls and gates of this city. He accomplished his purpose, but not without difficulties, arising partly from the poverty of the lower classes of the people, and partly from the opposition of the Ammonites and other foreign settlers. The Book of Nehemiah contains Nehemiah's account of his proceedings, with other matter which forms a supplement to the narration contained in the Book of Ezra.

NEILGHERRY (nēl'ge-ri) **HILLS**, a district and range of mountains in Madras Presidency, South Hindustan. Area, 957 sq. miles. Pop. 91,034.

NELSON, Horatio, Viscount, a great British admiral, was born Sept. 29, 1758, at Burnham Thorpe, in Norfolk; died Oct. 21, 1805. On the commencement of the war with the French Republic he was made commander of the Agamemnon, of sixty-four guns (1793), with which he joined Lord Hood in the



Admiral Lord Nelson.

Mediterranean, and assisted at the siege of Bastia (May, 1794). At the siege of Calvi (July 10, 1794) he lost an eye. For his gallantry at the battle of Cape St. Vincent (Feb. 14, 1797) he was made rear-admiral of the blue, and appointed to the command of the inner squadron

at the blockade of Cadiz. His next service was an attack on the town of Santa Cruz, in the Island of Teneriffe, in which he lost his right arm. In 1798 he joined Lord St. Vincent (Admiral Jervis), who sent him to the Mediterranean to watch the progress of the armament at Toulon. Notwithstanding his vigilance, the French fleet which conveyed Bonaparte to Egypt escaped. Thither Nelson followed, and after various disappointments he discovered the enemy's fleet moored in the Bay of Aboukir, where he obtained a most complete victory, all the French ships but two being taken or destroyed (August 1, 1798). This achievement was rewarded with the title of Baron Nelson of the Nile. His next service was the restoration of the King of Naples. In 1801 he was employed on the expedition to Copenhagen under Sir Hyde Parker, in which he effected the destruction of the Danish ships and batteries. On his return home he was created viscount. When hostilities recommenced after the Peace of Amiens Lord Nelson was appointed to command the fleet in the Mediterranean, and for nearly two years he was engaged in the blockade of Toulon. In spite of his vigilance the French fleet got out of port (March 30, 1805), and being joined by a Spanish squadron from Cadiz, sailed to the West Indies. The British admiral hastily pursued them, and they returned to Europe and took shelter at Cadiz. On the 19th of October the French, commanded by Villeneuve, and the Spaniards by Gravina, ventured again from Cadiz, and on the 21st they came up with the British squadron off Cape Trafalgar. An engagement took place, in which the victory was obtained by the British, but their commander was wounded in the back by a musket-ball, and shortly after expired. His remains were carried to England and interred in St. Paul's Cathedral.

NELUMBIUM, a genus of aquatic plants inhabiting the fresh waters of the



Nelumbium.

temperate parts of the world, type of the natural order Nelumbiaceæ, having large polypetalous flowers with numerous stamens. The best-known species is the Hindu and Chinese lotus, a magnificent water-plant of the rivers and ditches of all the warmer parts of Asia, the Malay Archipelago, Australia, and also found in the Nile. The numerous canals of China are filled with it, its tubers being there used as a culinary vegetable. It is a most beautiful plant,

NEPAL

with peltate leaves and handsome rose-colored flowers on tall stalks, and is frequently cultivated in hothouses. In Asia it is generally deemed sacred, and figures in religious rites. The yellow water-bean of the southern states, has starchy rhizomes, with tubers like those



Ripe receptacle of nelumbium.

of the sweet-potato, which are used for food.

NEMESIS, a female Greek divinity who appears to have been regarded as a personification of the righteous anger of the gods, inflexibly severe to the proud and insolent, i.e. retributive justice. In the theogony of Hesiod she is the daughter of Night, the avenging Fate who checks and punishes the favorites of Fortune.

NEOLITHIC, in archæology, a term applied to the more recent of the two periods into which the stone age has been subdivided, as opposed to palæolithic. During this period there is found no trace of the knowledge of any metal excepting gold, which it would seem had sometimes been used for ornaments. The Neolithic stone implements are finely shaped and polished, and are found in connection with the remains of extinct animals.

NE'OPHRON, a genus of birds of the vulture family, one species of which in-



Egyptian vulture, or Pharaoh's hen.

habits Southern Europe, Egypt, and Asia. It is known as the Alpine or Egyptian vulture, Pharaoh's chicken, etc.

NEO-PLATONISM. See New Platonists.

NEPAL', **NIPAL'**, or **NEPAUL'**, a small independent state situated on the n.e. frontier of Hindustan; area, about 54,000 sq. miles. The country is a tableland from 3000 to 6000 feet above the level of the sea. It contains within its boundaries the highest mountains in the world—Mount Everest, Dhawalagiri, and on its eastern borders Kanchinjanga. The principal products are rice, wheat,

barley, pulse, sugar-cane, buckwheat, hemp, cotton, tobacco, and madder. Pop. estimated at about 2,000,000.

NEPEN'THE, a drug which was fabled by the ancient poets to banish the remembrance of grief and to cheer the soul. It is thought by many to have been opium.

NEPTUNE, the chief marine divinity of the ancient Romans. When the Greek mythology was introduced into Rome he was completely identified with the Greek Poseidōn, all the traditions relating to whom were transferred by the Romans to their own deity. In art he is usually represented as armed with a trident, and the horse and the dolphin are his symbols. See Poseidōn.

NEPTUNE, in astronomy, the most distant of the known planets, its mean distance from the sun being 2,745,998,000 miles, and its least distance from the earth 2,629,000,000 miles. The eccentricity of its orbit is .00872; its inclination to the plane of the ecliptic is $1^{\circ} 47'$. Its apparent diameter is about $2.7''$. Its real diameter is estimated at 36,600 miles, and it seems to have very little polar compression. Its mass is about $16\frac{1}{2}$ times that of the earth, and it revolves round the sun in 164.6 years. It has one satellite, whose period is 5 days 21 h. 2 m. 44 s., and whose mean distance from the planet is 230,000 miles. Neptune was discovered in 1846 in a position indicated independently by Leverrier and Adams, and deduced from a series of recondite mathematical calculations to find a body which could account for the long-observed perturbations of Urānus.

NERBUDDA, or **NARBADA** (nar-ba-dā), a river of Hindustan. In religious sanctity it ranks second only to the Ganges. Nerbudda is also the name of a division of the Central Provinces of India; area, 17,513 sq. miles; pop. 1,881,147.

NERO, Lucius Domitius Ahenobarbus (after his adoption by the Emperor Claudius called Nero Claudius Cæsar Drusus Germanicus), Roman emperor, the son of Cneius Domitius Ahenobarbus and Agrippina, the daughter of Germanicus. He was born in 37 at

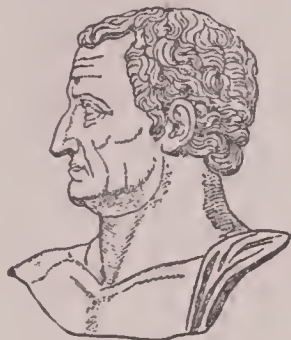


Nero.

Antium, and after the marriage of his mother, in third nuptials, with her uncle, the emperor Claudius, was adopted by that prince, and married to his daughter Octavia. When Nero was about seventeen years of age his abandoned mother poisoned her husband, Claudius, and succeeded in raising her son to the throne, over whom she expected to exercise the most absolute control.

Nero became emperor in 54, and the year following disposed of the rightful heir, Britannicus, by poison. For the first few years his public conduct, under the control of Burrhus and Seneca, was unexceptionable; in private, however, he disgraced himself by the most odious vices, and his mother endeavored to retain her influence by shamefully complying with his inclinations. In 59 Nero caused this detestable woman to be murdered, and then, fearing no rival in power, gave full scope to the darkest traits of his character. In 62 he repudiated his wife Octavia. In 64 the burning of Rome occurred, which has been charged, with great probability, upon Nero himself, who, however, accused the Christians of the act, and made it the occasion of the most dreadful cruelties toward them. His debaucheries and cruelties occasioned an almost general conspiracy against him, known as that of Piso, in 65, the discovery of which led to more tortures and bloodshed. The revolt of Vindex was also suppressed. That of Galba in 68 succeeded, and Nero escaped arrest by stabbing himself, being then in the thirty-first year of his age and the fourteenth of his reign. He was a lover of arts and letters, and possessed much taste as a poet and histrionic performer.

NERVA, the successor of Domitian, and one of the most virtuous of the Roman emperors. He was born in

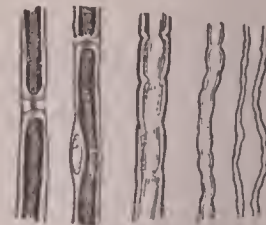


Nerva—antique gem.

Umbria in 32 A.D., died A.D. 98. He was twice consul, and was elected emperor on the death of Domitian in 96. He adopted Trajan, who succeeded him.

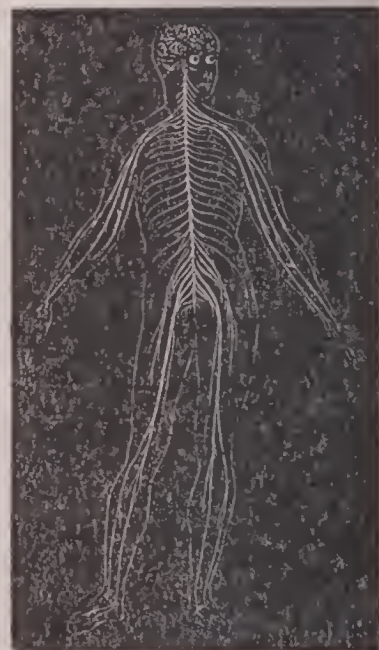
NERVE, Nervous System. A nerve is one of the fibres which proceed from the brain and spinal cord, or from the central ganglia of lower animals, and ramify through all parts of the body, and whose function is to convey impulses resulting in sensation, motion, secretion, etc. The aggregate of these nerves, and the centers from which they proceed, forms the nervous system, the medium through which every act or detail of animal life is inaugurated and directed. The essential idea of any nervous system involves the necessary presence, firstly, of a nerve center or centers, which generate the nervous force or impulse; secondly, of conducting fibres or cords, the nerves; and thirdly, of an organ, part, or structure to which the impulse or impression may be conveyed. The nerve-centers of man and vertebrates generally are disposed so as to form two chief sets, which are to be regarded as essentially distinct. The brain and spinal marrow together (see Brain) constitute the first

of these centers, and are collectively included under the name cerebro-spinal system or axis. The second system is the sympathetic or ganglionic. From each of these systems nerve-cords are given off—the cerebral and spinal nerves from the former; and the so-called



Nerve-fibres.

sympathetic fibres from the latter. The brain and spinal-cord are contained within the continuous bony case and canal formed by the skull and spinal column; while the chief masses of the sympathetic system form an irregularly disposed chain, lying in front of the spine, and contained within the cavities of the thorax or chest and abdomen. The general functions of the cerebro-spinal system are those concerned with volition and muscular movements, with

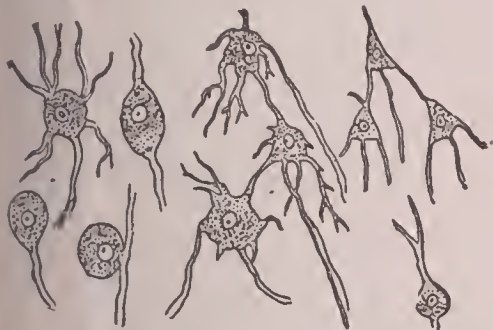


Main nerves of the human body.

the control of the senses, and in higher forms with the operations of the mind. The nerves of the sympathetic system in chief are distributed to the viscera, such as the heart, stomach, intestines, blood-vessels, etc.; and the operation of this system is in greater part of involuntary kind, and without the influence or command of the will. The cranial or cerebral nerves pass from the brain through different openings in the skull, and are all in pairs, the first pair being the olfactory nerves or nerves of smell; the second, the optic nerves, or nerves of sight; while others have to do with hearing, taste, general sensibility, and muscular motion. The spinal nerves, after issuing from their openings in the vertebral column, split into two divisions, one of which proceeds to supply parts behind the spine, while the other

passes toward the front. The first eight spinal nerves on each side are called cervical, the next twelve are dorsal, the next five lumbar, then five sacral, and one coccygeal.

All nervous structures consist of two elements, nerve-cells and nerve-fibres. The cells and fibres are combined and associated in various ways, and are imbedded in and supported by fine connective tissue so as to form a connected structure. The cells vary in size from $\frac{1}{1000}$ to $\frac{1}{100}$ of an inch, and consist of masses of protoplasm containing a nucleus and nucleolus. Processes or poles pass from the cell, branching outward.



Various forms of nerve-cells.

Nerve-fibres are of a glossy transparency and of a tubular form. They consist of a rod passing down the center, called the axis-cylinder, which is surrounded on all sides by a white substance, the whole being inclosed in a delicate sheath (neurilemma). The axis-cylinder is a continuation of the nerve-cell process, and acts in an analogous manner to an electric conductor. The nerve-fibres may exhibit a diameter so great as the $\frac{1}{1000}$ th of an inch; but their average breadth may be stated to vary from $\frac{1}{5000}$ th to the $\frac{1}{1000}$ th of an inch. The largest fibres are those of the nerve-trunks themselves; and they diminish in size in the neighborhood of the nerve-centers—brain and spinal marrow—and as they approach to the periphery of the body or to their ultimate terminations. The nerve-fibres of the brain and spinal marrow do not exhibit a limiting membrane; and in the gray matter of the brain and cord the fibres are of exceedingly small size, not exceeding the $\frac{1}{10000}$ th or $\frac{1}{15000}$ th of an inch in diameter.

The general functions of nerve-fibres may be briefly considered under two aspects. The fibres may convey impressions from the brain or nerve-centers to their peripheral extremities, or to the parts to which they are distributed. Or secondly, they may transmit impressions from the periphery, or from the parts they supply, to their centers. A double series of nerve-fibres, each set subserving one or other of the preceding functions, exists in the cerebro-spinal as well as in the sympathetic nervous system. These series are therefore known as sensory, afferent, or centripetal nerves, when they transmit impressions from their peripheral extremities to the brain or centers; and as motor, efferent, or centrifugal nerves, when they carry impressions from the centers to their peripheral terminations. Stimuli of various kinds applied to the nerves arouse the so-called excitability of the fibres, and

through this property nerves convey impressions thus made upon them. Impressions have been calculated to pass along a nerve at the rate of about 200 feet per second. Nerve-fibres in any case—motor or sensory—can carry one kind of impulse only, corresponding to the kind of fibre. In certain nerves the impulses or impressions are of a limited or specialized kind, as in the nerves of special sense—for example, sight, hearing, smell—whereby certain distinct sensations, of light, sound, or odors, are produced. And such nerves, therefore, respond only to stimuli of a special kind. The various nerve-centers of the body which originate, or at any rate direct and dispose, the nerve-force, may be viewed as simply ganglia, or as collection of ganglia, or nervous masses. The brain itself falls under this latter division. The general functional relations existing between the nerve-centers and the nerves may be simply illustrated by the phenomena comprehended under the name of reflex action. When a peripheral nerve-fibre is irritated a sensory or centripetal impression is conveyed toward the nerve-center. Arriving at the center the impression is converted into a motor or centrifugal one, and travels along the motor nerve-fibres, to excite, it may be, a muscle or other part to action. The general functional relation of the nervous system may be summarized by stating that its functions comprehend the reception and distribution of impressions; that these impressions originate either from influences acting on the periphery, or from the nerve-centers, brain, or mind; that these impressions respectively influence or stimulate the mind or nerve-centers, and the muscles or secreting structures; and lastly, that all nervous phenomena are exerted through or accompanied by nervous action, and that this latter is, so far as physiology has yet been able to determine, of a uniform and similar kind. See also Eye, Ear, Nose, etc.

The Invertebrata possess no such specialization of the nervous centers as is seen in Vertebrates, in which the brain and spinal cord are inclosed within their bony case and canal, and thus shut off from the general cavity of the body. The great and distinctive feature between the nervous system of Vertebrata and that of lower forms consists in the absence of a defined or chief nervous center, through which consciousness may intervene to render the being intelligent, and aware of the nature of the acts it performs.

NERVOUS DISEASES, are diseases due either to actual changes in the structure of nerve-fibres or nerve-centers, or to some irregularity of nerve function without actual structural change. Thus nervous diseases may be due to inflammation or degeneration of nerve substance; to the pressure on some part of the nervous system of tumors, effused blood, or other fluid; to the death of some part by the cutting off of its blood supply, etc.; or may be the result of lowered nervous action as a part of general bad health.

NERVOUS SYSTEM. See Nerve.

NEST, the abode or habitation, varying greatly in form, materials, and situa-

tion, constructed by birds chiefly for the purpose of incubation and the rearing of the young. The nests of birds are of the most diverse character, some birds making little or no nest, while others construct receptacles for the eggs requiring a vast amount of skill and industry. The materials used are also extremely various, being such as mud or clay, twigs, or branches, leaves, grass, moss, wool, feathers, etc. Some birds, for the sake of protection, excavate burrows in banks or sandy cliffs in which to make their nests. Many mammals also are nest-builders, notably mice, moles, dormice, squirrels, foxes, weasels, badgers, rabbits, etc.; and nests are also constructed by certain fishes, reptiles, crustaceans, insects, etc. See Birds' Nests, Edible.

NESTOR, one of the Greek heroes at Troy, son of Neleus, king of Pylos. He took part in the hunting of the Calydonian boar, and in the Argonautic expedition. He is noted as the wisest adviser of the chiefs before Troy, after the fall of which he retired to Pylos, where he lived to a great age.

NET, a term applied to that which remains of a weight, quantity, etc., after making certain deductions. Thus net weight is the weight of merchandise after allowance has been for casks, bags, or any inclosing material.

NET, an open fabric made of thread, twine, or cord, woven into meshes of fixed dimensions, firmly knotted at the intersections. Nets are used for a great variety of purposes, as for protecting fruit-trees, for collecting insects for hammocks, screens, etc., but chiefly for hunting and fishing. The chief kinds of nets used in fishing are the trawl, the drift, the seine, the kettle or weir, and the trammel or set nets. The trawl is a triangular bag with an arrangement for keeping its mouth open, drawn along the bottom of the water. The drift and seine nets are very long in proportion to their breadth, and differ from one another only in the manner in which they are employed. The seine has a line of corks along one of its long borders, and a line of leaden weights along the other; so that when thrown into the water it assumes a perpendicular position. It is used near the shore, being dragged to land with any fish it may enclose, by ropes fastened to the ends. The drift-net is not loaded with lead, but floats in the water, and is used especially in herring-fishing, the fishes as they drive against it becoming caught by the gills. Kettle and weir nets are structures fixed on stakes placed along the coast between high and low water. Trammel or set nets are also fixed between stays, but act like drift-nets.

NETHERLANDS, The, or **HOLLAND**, a kingdom of Europe which lies on the North Sea, n. of Belgium and w. of part of Northern Germany. Its area is 12,648 sq. miles; its pop. in 1901 was 5,263,267. The country is divided into eleven provinces: North Brabant, Gelderland, South Holland, North Holland, Zeeland, Utrecht, Friesland, Overijssel, Groningen, Drenthe, and Limburg. The ruler is also sovereign (grand-duke) of the Grand-duchy of Luxemburg. In addition to her European territories Holland

possesses extensive colonies and dependencies in the Asiatic archipelago and America; including Java, Sumatra, great part of Borneo, Celebes, part of New Guinea, Surinam or Dutch Guiana, the West Indian islands of Curaçao, Saba, St. Eustatius, etc. Estimated colonial pop. about 38,200,000.

The Netherlands (or Low Countries, as the name implies) form the most characteristic portion of the great plain of northern and western Europe. It is the lowest part of this immense level, some portions of it being 16 to 20 feet below the surface of the sea, and nearly all parts too low for natural drainage. The coast-line is very irregular, being marked by the great inlet of the Zuider Zee, as well as by various others, and fringed by numerous islands. In great part the coast is so low that were it not for massive sea-dykes large areas would be inundated and lost to the inhabitants. The highest elevation, 656 feet, is in the extreme southeast. The general aspect of the country is flat, tame, and uninteresting, and about a fifth of the whole surface consists of marsh, sand, heath, or other unproductive land.

The chief rivers of the Netherlands are the Rhine, Maas (or Meuse), Scheldt, and IJssel. The navigable canals are collectively more important than the rivers, on which indeed they depend but they are so numerous as to defy detailed description. The chief are the North Holland, Canal between Amsterdam and the Helder, length 46 miles; and the more important ship canal, 15 miles long, 26 feet deep and 197 wide, from the North Sea to Amsterdam, and connected by locks with the Zuider Zee. Lakes are also very numerous. The climate of the Netherlands is humid, changeable, and disagreeable. Wheat, of excellent quality, is grown only in favored portions of the south provinces—Rye, oats, and buckwheat, with horse, beans, beet, madder, and chicory, are more common crops; and tobacco is cultivated in the provinces of Gelderland, South Holland, and Utrecht; flax in North Brabant, South and North Holland, Friesland, and Zeeland; and hemp, sugar-beet, oil-seeds, and hops in various parts of the kingdom. Culinary vegetables are cultivated on a large scale, not merely for the sake of supplying the internal demand, but, also for the exportation of the seeds which form an important article of Dutch commerce. But it is in stock (cattle, horses, sheep, swine, goats), and dairy produce in particular, that the rural industry of the Netherlands shows its strength.

The commerce of the country was at one time the most important in the world, and is even yet of great importance and activity. The external commerce is chiefly carried on with Great Britain, Germany, Belgium, and the Dutch colonies in the East. Among imports from the United Kingdom the chief are cottons and woollens, metal goods and machinery; the chief exports, butter and butterine, live animals, wine and spirits, silks, sugar. The foreign trade centers chiefly in Amsterdam and Rotterdam. The industrial occupations are varied. Shipbuilding and subsidiary

trades are among the chief. Of textile manufactures that of linen is the most important; but silks and velvets, as well as woollens and cottons, are produced in considerable quantity. Pigments, brandy, gin, paper, glass, earthenware, etc., are among the more important products. Large numbers of the seaboard population are employed in the deep-sea fisheries. Railways have a length of 1725 miles.

The stock to which the people belong is the Teutonic, the great majority of the inhabitants being descendants of the old Batavians. They comprise over 70 per cent of the population, and are chiefly settled in the provinces of North and South Holland, Zeeland, Utrecht, and Gelderland. The Flemings of North Brabant and Limburg, and the Frisians, inhabiting Friesland, Groningen, Drenthe, and Overijssel, form the other groups. The majority of the people belong to the Dutch Reformed Church (a Presbyterian body); the remainder being Roman Catholics, Old Catholics, Jews, etc. All religious bodies are on a perfect equality. The government is a constitutional monarchy, the executive being vested in the king, and the legislative authority in the states-general, sitting in two chambers. The upper chamber, fifty in number, is elected by the provincial councils or assemblies of the eleven provinces; the lower chamber, 100 in number, is elected directly, the electors being all males of twenty-three years of age taxed at a certain figure. The members of the lower house are paid. Elementary schools are everywhere established, and are partly supplied by the state, but education is not compulsory. Higher class schools are in all the chief towns; while there are state universities, namely, at Leyden, Utrecht and Groningen, and the municipal university at Amsterdam. The commercial capital of the country is Amsterdam, but the seat of government and residence of the sovereign is the Hague.

The southern portion of the Low Countries belonged at the beginning of the Christian era to Belgic Gaul. (See Gaul.) The northern portion, inhabited by the Batavians and Frisians (see those articles), formed part of Germany. The southern portion as far as the Rhine was held by Rome up to A.D. 400, after which it came under the rule of the Franks, as did also subsequently the rest of the country. In the 11th century the territory comprised in the present kingdoms of Belgium and the Netherlands formed a number of counties, marquisesates, and duchies corresponding more or less with the modern provinces. By the latter part of the 15th century all these had been acquired by the Duke of Burgundy, and passed to the house of Hapsburg on the marriage of the daughter of Charles the Bold of Burgundy to the son of the Emperor Frederick III. On the abdication of Charles V. in 1556 they passed to his son Philip II. of Spain. In consequence of religious persecution in 1576 Holland and Zeeland openly rebelled, and in 1579 the five northern provinces—Holland, Zeeland, Utrecht, Guelders, and Friesland concluded the celebrated Union of Utrecht by which they declared them-

selves independent of Spain. They were joined in 1580 by Overijssel, and in 1594 by Groningen. After the assassination of William of Orange, July 10, 1584, Maurice became stadtholder (governor). His victories at Nieuport and in Brabant, the bold and victorious exploits of the Dutch admirals against the navy of Philip II., the wars of France and England against Spain, and the apathy of Philip II., caused in 1609 the Peace of Antwerp. But Holland had yet to go through the Thirty Years' war before its independence, now recognized by all the powers except Spain, was fully secured by the Peace of Westphalia. In the middle of the 17th century the United Netherlands were the first commercial state and the first maritime power in the world, and for a long time maintained the dominion of the sea. The southern provinces alternated between the rule of Spain and Austria till 1797, when they came under the power of the French Republic. In 1806 Louis Napoleon became king of Holland, but in 1810 it was incorporated with the French Empire. In 1814 all the provinces both of Holland and Belgium were united by the Treaty of Paris to form the Kingdom of the Netherlands. This arrangement lasted till 1830, when the southern provinces broke away and formed the Kingdom of Belgium. King Willem I. attempted to reduce the revolted provinces by force; but the great powers intervened, and finally matters were adjusted between the two countries in 1839. (See Belgium.) The king abdicated in 1840, and was succeeded by his son Willem II. (1840-49), he being again succeeded by his son Willem III., who died in 1890, leaving his ten-year-old daughter Wilhelmina as queen.

NETTLE, a genus of plants consisting chiefly of neglected weeds, having oppo-



Upper part of a fruiting stem of nettle. a, the male flower; b, the female flower; c, a stinging hair, taken from the leaf, highly magnified.

site or alternate leaves, and inconspicuous flowers, which are disposed in axillary racemes. The species are mostly herbaceous, and are usually covered with extremely fine, sharp, tubular hairs, placed upon minute vesicles filled with an acrid and caustic fluid, which by

pressure is injected into the wounds caused by the sharp-pointed hairs. Hence arises the well-known stinging sensation when these plants are incautiously handled.

NETTLE-RASH, a common disease of the skin, an eruption closely resembling nettle-stings both as to appearance and as to the sensation it originates. It consists of small wheals, either red or white, sometimes both, having the centers white and the margins red. The disease may be either acute or chronic. When it is acute generally more or less of fever accompanies it. In almost all cases it arises from a disordered condition of the digestive organs, produced either by indigestible food, or in some persons by particular kinds of food which others eat with complete impunity.

NEUFCHÂTEL (neu-shā-tel), Neuchâtel, a Swiss canton, bounded by France, Vaud, the Lake of Neuchâtel, and Bern, with an area of 312 sq. miles. Several ridges of the Jura run through the country. The Lake of Neuchâtel, 24 miles long by 8 broad, communicates through the Aar with the Rhine. Grazing and dairy-farming are extensively carried on in the canton; wine, fruits, hemp, and flax are produced. The chief manufactures are lace, cotton, watches, and clocks. The religion is Protestant. The language is French, but German is also spoken. Pop. 126,279.—The capital, which has the same name, lies 24 miles west of Bern, on a steep slope above the northwestern shore of Lake Neuchâtel. Pop. 21,354.

NEURALGIA, the name given to that species of morbid pains which occur only in the course of one or more distinct nerves, and by this locally are distinguished from other pains. In neuralgia of the fifth nerve the pain is in one half of the face, and if the central branch is affected the pain is confined to the upper jaw; neuralgia of the chief nerve of the thigh (sciatic nerve) extends along the buttocks and back of the thigh down to the knee, and is called sciatic. It also affects the front, back, and outside of the leg, and the whole foot except its inner border; while neuralgia of the intercostal nerves manifests itself in a belt or circle of pain around the breast. The presence of neuralgia almost invariably indicates a weak state of the system. The most common and best ascertained of the neuralgias are those of the nerves of the skin (dermalgia); but nerve pains occur also in other parts, as in the joints, muscles, and in the bowels (enteralgia). Many of the internal parts may be the seat of similar local affections; such, for example, are nervous affections of the heart and respiratory organs, which, however, do not usually manifest themselves by acute pain, but by special symptoms. The primary causes of the injury to the nerve producing neuralgia may be very various. It may be inflammation of the nerve itself, a swelling in or upon it, irritation of it produced by an ulcer or suppuration or swelling of the adjacent parts, especially the cavities of the bones, etc. Thin-blooded persons and those of weak nerves are most liable to be affected by neuralgia, which varies much both in degree and duration. It is

often chronic, and often suddenly occurs during the progress of other acute diseases, as in typhus or intermitting fevers. The treatment also of course varies with the nature of the different cases, some admitting of easy cure by the administration of nourishing food, and by the use of iron and quinine, and other tonics, while for others the aid of surgery has to be called in.

NEURASTHENIA, is sometimes called the American disease, but now recognized as a world wide malady, is perhaps the most frequent of the acquired nerve diseases. All forms of nervous energy are as a rule reduced and fatigue quickly follows the exercise of any of the functions. It occurs principally during the productive period of life but sometimes occurs in neurotic children and nervous adults of advanced years. High altitudes, extremes of climatic conditions, wasting diseases, vicious habits, physical illness, injury, shock, and fright, or protracted anxiety, grief, worry, and excitement, are competent causes. Excesses of all varieties, and finally and most important of all, overwork, must be added to the list. The only essential element in the causation of neurasthenia is overstrain and this is a quantity relative to the inherent capacities of the individual and often correlated with hereditary tendencies or defects.

NEURITIS, inflammation of a nerve. Tenderness in the course of the nerve and pain recurring in paroxysms are among the symptoms. Paralysis may occur as a result, and in the case of a special nerve of sense loss of the particular sense. Neuritis of the optic nerve, for instance, is a frequent cause of blindness.

NEUROLOGY, the branch of science concerned with the anatomy, physiology, disorders and diseases of the nervous system.

NEUROSIS, a morbid, nervous state, either functional or organic. Neuroses are classed as disorders of motion, sensory disorders, disorders of nutrition, of heat perception, of circulation and mixed neuroses. Among the latter are certain disorders affecting the extremities and the sexual organs.

NEUROTIC, a term introduced into medicine to indicate some relationship to the nervous system. Thus a neurotic disease is a nervous disease. So medicines that affect the nervous system, as opium, strychnine, etc., are called neurotics.

NEUTER, in zoology, a term applied to indicate those insect forms—represented chiefly among the ants, bees, and wasps—in which the characteristics of sex are either present in a rudimentary condition or may not be developed at all. Thus among the ants the community consists of males, females, and neuters or "workers" as they are also termed. These ant-neuters are simply (sexually) undeveloped females, and upon these forms the performance of all the laborious duties of the ant-colony devolves. In the bees the neuters, or workers, are similarly sterile females. The differences between the fertile females and neuters—both of which are developed from fertilized ova—appear to be produced

through differences in the food upon which the respective larvæ are fed, and through similar and surrounding circumstances which affect the nutritive development of the larvæ. Plenty of food is thus said to produce females, and a scantier or different dietary males or neuters. See Parthenogenesis, Ant, Bee, Wasp.

NEUTRALITY, means, in the law of nations, that state of a nation in which it does not take part, directly or indirectly, in a war between other nations. To maintain itself in this state a nation is often obliged to assume a threatening position, to be able to repel, in case of necessity, every aggression on the part of either of the belligerents. Such neutrality is termed an armed neutrality. In maritime wars the treatment of effects of the enemy on board neutral vessels, or neutral effects on board a hostile vessel, gives rise to very important questions. In former times the principle was pretty generally admitted, that the ownership of the goods on board of the vessels was the only point to be considered, and not the property of the vessels themselves. The belligerents, therefore, seized merchandise belonging to the enemy on board of neutral vessels; but they restored neutral property seized under the enemy's flag. But the endless investigations which this system caused, since a consequence of it was the searching of neutral vessels, produced by degrees a new and totally contrary principle, that the flag protects the cargo. The plenipotentiaries of Great Britain, Austria, France, Prussia, Russia, Sardinia, and Turkey, assembled at Paris in April, 1856, agreed that the neutral flag should cover an enemy's goods, with the exception of contraband of war; and that neutral goods, with the exception of contraband of war, are not liable to capture under the enemy's flag. In the arbitration (in 1872) at Geneva of the Alabama claims of the United States against Great Britain, three rules were agreed to by the parties, to the effect that a neutral government is bound to use due diligence to prevent the fitting out in, or departure from, any of its ports of a vessel which it has reasonable ground to believe is intended to carry on war with a power with which it is at peace; that it is bound not to permit a belligerent to make use of its ports as a basis of naval operations, or a source of recruitment of men or military supplies that it is bound to exercise due diligence in its own ports or waters, and as to all persons within its jurisdiction, to prevent any violation of these duties and obligations.

NEUTRAL TINT, a pigment used in water-colors, of a dull grayish hue partaking of the character of none of the bright colors. It is prepared by mixing together blue, red, and yellow in various proportions.

NEVADA (ne-vā'da), one of the United States. It is bounded on the north by Oregon and Idaho, on the east by Utah and Arizona, the Arizona boundary being continued on the southeast by the Colorado river as far as the 35th parallel, while a straight line running from the latter point north-

west to Lake Tahoe in latitude 39° n. and thence along the 120th meridian separates Nevada from California on the southwest and west. It ranks fourth in size among the states of the Union. The area is 110,700 sq. miles. It is rather mountainous, having the slopes of the Sierra Nevada.

Nevada owed her early development to mining. Immensely rich lodes of silver and gold were discovered, one of which—the Comstock lode—produced as high as \$38,000,000 worth of bullion in one year. With the apparent exhaustion of the Comstock lode, the industry decreased considerably. Gold, copper, lead, and iron ore are also mined. The other minerals found in the state are antimony, mercury, nickel, sulphur, gypsum, salt, and borax.

Agriculture is less developed in Nevada than in any other state. It is the most arid of the states and at the same time contains the most meagre



Seal of Nevada.

sources for an artificial water supply. The most extensive irrigated areas are along the Humboldt river and in the west-central part of the state. The industry centers about stock-grazing, the tilling of the soil being a mere adjunct to it. The animal products, together with the hay and forage and other products fed to live stock, comprise 80.6 per cent of the total value of farm products. Stock-raising being so prominent, hay and forage are naturally the most important of the crops grown. Alfalfa, wheat, barley, oats, and potatoes are also cultivated.

The railroad mileage is a little over 1000 miles. The principal line is the Southern Pacific, running from east to west through the state. There are no navigable streams.

The first settlement in Nevada was made at Genoa, at the foot of the Sierra Nevada, in 1850, though as early as 1848 the Mormons traveling between Salt Lake and California had established a temporary camp at that place. The Mormons made two or three small settlements in the valleys along the base of the Sierra, and until 1859, when the silver mines of the Comstock were discovered, they were the principal white inhabitants. The discovery of silver caused great crowds of miners of all nationalities to pour over the Sierra Nevada from California, and in that

year and 1860 several towns were laid out and rapidly built up. In a few years new mineral belts were discovered to the eastward, and soon there were founded many interior towns and camps. When Utah territory was formed, September 9, 1850, the western boundary was fixed as the summit of the Sierra Nevada mountains and so included much of the present state, but the territorial organization did not extend at once to the extreme west, and the inhabitants organized a government of their own. A petition for territorial government was sent to congress in August, 1857, and in 1858 a provisional government was formed. In 1860 another petition was sent to congress and the territorial delegate applied for admission. Meanwhile the Comstock lode had been discovered in June, 1859, and miners flocked thither from every direction. The new territory was separated from Utah, March 2, 1861, being bounded on the east, however, by the 116th meridian. Another degree was cut from Utah, July 14, 1862, and on May 5, 1866, the eastern boundary was extended to the 114th meridian and that part of the state lying below 37° was taken from Arizona. Congress in March, 1864, passed an enabling act and in July the constitution was accepted, and the state was admitted October 31st. Politically the state is swayed largely by local interests. It was republican in national elections until 1892, when it was carried by the people's party. In 1896, 1900 and 1908, it voted for the free-silver candidate, William Jennings Bryan. The capital is Carson City, but Virginia City (pop. 6500) is the largest town. Pop. 132,000.

NEVADA, a city and the county seat of Vernon co., Mo., 100 miles south of Kansas City; on the Missouri Pacific and the Missouri, Kansas and Texas railroads. Nevada became the county seat in 1858, and was incorporated in 1870. Pop. 10,000.

NEVADA, Emma, an American dramatic soprano, born in Austin, Nev., in 1861. She first appeared in opera in London and subsequently sustained leading parts in the leading cities of the continent, making her first professional tour of the United States in 1884-85. She had a wide repertoire, but perhaps her most successful rôle was Mignon, which part she sang for an entire year in Paris.

NEVADA STATE UNIVERSITY, the head of the educational system of the state of Nevada and the only institution of collegiate grade within the state; founded at Elko in 1873 and removed to Reno in 1885. The university comprises the college of agriculture, including departments of dairying and domestic arts and sciences, the college of arts and science, the college of applied science, with departments of mining and metallurgy and mechanical and civil engineering, the State Normal School, and the University High School. Military instruction forms part of the curriculum and a uniform is worn by the students. The degrees conferred are those of B. A., B. S., M. A., M. S., and mining, mechanical and civil engineer.

NEW, for names beginning with this

adjective not given here, see the articles under the name which follows it.

NEW ALBANY, a city in Indiana, on the Ohio, opposite Louisville, Ky., with which it is connected by several bridges. Steamboat building is carried on, and there are iron-foundries, rolling-mills, woolen factories, glass-works, etc., Pop. 24,114.

NEW AND LATTER HOUSE OF ISRAEL, See Jezreelites.

NEW ARCHANGEL. See Sitka.

NEWARK, the capital of Licking co., Ohio, on the Balt. and Ohio, and the Pitts., Cin., Chi. and St. L. railways, and the Ohio and Erie Canal; 33 miles n.e. of Columbus. The car-shops of the Balt. and Ohio railroad are located here, and there are also manufactories of glass, portable engines, stoves, iron-bridge work, paper, wire-cloth, carriages, flour, lumber, and soap. Pop. 21,216.

NEWARK, a city and port, the capital of Essex co., New Jersey, 9 miles west of New York City, finely situated on the west side of Passaic river, about 4 miles from its mouth in Newark bay. It is the largest city in the state, and is regularly laid out with wide, straight streets, generally intersecting at right angles. Broad street, the principal thoroughfare, is more than 120 feet broad, shaded with elms, and divides the city into two nearly equal parts. Newark is distinguished as a manufacturing town, the goods including furniture, machinery and castings, leather, boots and shoes, saddlery, oil-cloth, hardware, clothing, india-rubber goods, etc. there are also textile factories (cotton, woolen), and an extensive sewing-machine factory. There is a considerable coasting trade and constant steamboat communication with New York. Pop. 1909 about 300,000.

NEW BEDFORD, a city and port of Massachusetts, 55 miles south from Boston, on the estuary of the Acushnet, which opens into Buzzard's bay. It has cotton-factories, iron and copper works, oil and candle works, shoe factories, etc. It was at one time the center of the American whale-fishery, but this industry has much declined. Pop. 100,000.

NEWBERN, a city of North Carolina, the port of entry for Pamlico district on the estuary of the Neuse, which opens into Pamlico Sound. It has a large trade in lumber, tobacco, cotton, and naval stores. Newbern was founded by Swiss settlers in 1710. Pop. 10,210.

NEW BRIGHTON, a part of Richmond borough, New York City, on Staten Island, 6 miles southwest of Manhattan. It contains the "Sailor's Snug Harbor" for aged and disabled seamen of the port of New York, an institution for destitute children of seamen, and many fine residences of New York men of business. Pop. 25,331.

NEW BRITAIN, a city in Hartford co., Conn., on the N. Y. and N. E. and the N. Y., N. H. and Hart. railways; 4 miles s.w. of Hartford. The industries include the manufacture of iron and brass goods, artistic bronze house trimmings, builders' hardware, cutlery, hosiery, joiners' tools, and brick. Pop. 33,112.

NEW BRUNSWICK, a province of the Dominion of Canada, on the east coast

of North America. Its coast-line is interrupted only at the point of junction with Nova Scotia, where an isthmus of not more than 14 miles in breadth connects the two territories, and separates Northumberland Strait from the Bay of Fundy. The principal rivers are the St. John, 450 miles in length, and navigable for vessels of 100 tons to Fredericton, 90 miles from its entrance into the Bay of Fundy; and the Miramichi, 225 miles in length, which falls into the bay of the same name, and is navigable for large vessels 25 miles from the gulf. New Brunswick is one of the most amply wooded countries in the world, and the forests supply three-fourths of the total exports, now including wood pulp for paper. The fisheries are very valuable. The minerals exported include coal, gypsum, antimony ore, copper ore, manganese, plumbago, and unwrought stone. Owing to its cheap coal and proximity to the markets of the world, New Brunswick is expected to develop as a manufacturing country, especially now that the railway system has been completed throughout the interior of the province. The affairs of the province are administered by a lieutenant-governor (appointed by the governor-general in council), aided by an executive or advisory council consisting of seven members, and a legislative assembly of forty-six representatives of the people. The province has ten seats in the Dominion senate and fourteen in the House of Commons. The capital is Fredericton, but the chief commercial center is St. John, which has one of the finest harbors on the North Atlantic. Pop. in 1891, 321,263; in 1901, 331,120.

NEW BRUNSWICK, a city in New Jersey, on the Raritan, which here becomes navigable, 29 miles southwest of New York. The Dutch Reformed Church has here Rutgers College and a theological seminary. There are manufactures of india-rubber goods, paper-hangings, machinery, etc. Pop. 24,116.

NEW BURG, a city of New York state, occupying a commanding position on the west bank of the Hudson river, 60 miles north of New York City. It has a large river trade, especially in coal and timber. Here is the theological seminary of the Associate Reformed Church. Here also is Hasbrouck House, Washington's headquarters in 1782-83. Pop. 29,715.

NEW BURYPORT, a city and port of Massachusetts, about 3 miles above the mouth of the Merrimac. It contains the University of Modern Languages and has cotton-mills, shoe-factories, and ship-building yards. Pop. 15,895.

NEW CALEDONIA, an island in the Pacific, situated about 800 miles east of Australia. It was discovered by Captain Cook in 1774, and appropriated by the French as a convict settlement in 1854. With the adjacent Loyalty Islands the area is estimated at 6724 sq. miles, and the population at 60,703.

NEW CASTLE, the principal shipping port of New South Wales after Sydney, situated at the mouth of the Hunter river, about 75 miles northeast from Sydney, on ground rising somewhat steeply from the sea. The principal export is coal from the extensive mines of the neighborhood, which give em-

ployment to over 5000 men. Pop. 53,741.

NEWCASTLE, Duke of. See Caven-dish.

NEW CASTLE, the capital of Lawrence co., Pa., at the confluence of the Shenango and the Neshannock rivers, which here form the Beaver river, and on the Erie, the Penn., the Pitts. and Lake Erie, the Pitts. and W., and the W. N. Y. and Penn. railways; 52 miles n. by w. of Pittsburg. It is in a bituminous coal, limestone, fire-clay, iron-ore, and sandstone region, and has numerous blast furnaces and mills. Pop. 33,160.

NEWCASTLE-UNDER-LYME, a municipal and parliamentary borough of England, Staffordshire, close to the Potteries and 19 miles n.n.w. of the town of Stafford. Pop. of municipal borough, 19,914; of parliamentary borough 60,667.

NEWCASTLE-UPON-TYNE, a municipal, parliamentary, and county borough in the county of Northumberland, but forming a county in itself. Among the public buildings are the Cathedral of St. Nicholas, an ancient Gothic structure; the Roman Catholic church and Cathedral of St. Mary; the town-hall, the Moot hall in which the assizes for the county are held; the castle, the Central railway-station, the public library and the general market. Some of the more important of its industries are ship-building; and the manufacture of locomotive and marine engines; cannon, shot, tools, fire-bricks, hemp and wire ropes, cables, anchors, sails. Situated in the midst of one of the largest coal-fields in England, it exports immense quantities of coal. Pop. 214,881.

NEWCOMB (nū'kom), Simon, American astronomer and mathematician, born in Wallace, Nova Scotia, in 1835. He came to the United States in 1853. In 1861 he was appointed professor of mathematics in the United States navy. He was secretary of the Transit of Venus Commission in 1871-74, observed the transit of Venus at the Cape of Good Hope in 1882, and directed several eclipse expeditions, beginning in 1860. He was professor of mathematics in Johns Hopkins University in 1894-1901 and editor of the American Journal of Mathematics. He was a member of nearly all the Imperial and Royal Societies of Europe and of the various scientific associations of this country. He was awarded the Copley, the Huygens, the Royal Society, and the Bruce medal; and numerous other prizes and honorary degrees.

NEW'COMEN, Thomas, a locksmith at Dartmouth, in Devonshire, toward the close of the 17th century, and one of the inventors of the steam-engine. Newcomen conceived the idea of producing a vacuum below the piston of a steam-engine after it had been raised by the expansive force of the steam, which he effected by the injection of cold water to condense the vapor. The merit of first applying the steam-engine to practical purposes is thus due to Newcomen, who, in conjunction with Captain Savery and John Cowley, took out a patent for the invention in 1705. See Steam-engine.

NEW ENGLAND, the northeast portion of the United States, comprising the

states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. Originally called North Virginia when granted by James I. to the Plymouth Company in 1606, it received the name of New England from Captain John Smith, who explored and made a map of the coast in 1614.

NEW'FOUNDLAND, a large island of British North America, in the Atlantic Ocean, at the mouth of the Gulf of St. Lawrence, and nearer to Britain than any other part of America—the distance from the port of St. John's to the harbor of Valentia, in Ireland, being only about 1918 miles. Area, excluding the territory of Labrador on the mainland, which belongs to this colony, 40,000 sq. miles. The famous banks of Newfoundland around the coasts swarm with almost every variety of fish, particularly cod. The cod-fishery is prosecuted from June to November, and may be said, with the other fisheries, of seal, lobster, herring, and salmon, to form the stable occupation of the inhabitants. Cod-fish is far the largest export. The trade is chiefly with Britain, Canada, and the United States. The affairs of the colony are administered by a governor, appointed by the crown; an executive council composed of the governor and six responsible ministers; a legislative council of fifteen members, nominated by the governor; and a house of assembly of thirty-six members, elected by manhood suffrage (according to act of 1889). Newfoundland was discovered by John Cabot in 1497, and the first English colony was planted in 1621. A struggle for supremacy took place between the English and the French; but in 1713 Newfoundland and its dependencies were declared, by the Treaty of Utrecht, to belong wholly to Great Britain, the French reserving a right to fish and cure on certain parts of the coast. Responsible government was granted in 1833. The colony, as yet, declines to join the Canadian Confederation. The only noteworthy town on the island is St. John's, the capital. Pop. 216,615.

NEW GRANADA. See Colombia.

NEW GUINEA, or **PAPUA**, a large island in Australasia, next to Australia



Natives of New Guinea.

the largest on the globe; area, 305,900 sq. miles; length about 1500, breadth from 200 to 400 miles. The island is rich in tropical products, possesses a copious and peculiar flora and fauna (birds of paradise being especially numerous and gorgeous), and is suitable for tropical agriculture. On the west coast there are numerous Malay settlements, but the

bulk of the inhabitants are Papuas, a race resembling the negroes of Guinea. The discovery of New Guinea was made by the Portuguese early in the 16th century, but little was known of it till recently. The naturalists were the first to make incursions into its interior, and among these Mr. A. R. Wallace, who visited it in 1858, was the pioneer. The delimitation and division of the island between Great Britain, Germany, and Holland was settled in 1885. That part of the island lying west of the 141st meridian is assigned to Holland, and comprises 150,755 sq. miles; the northern part of the rest of the island is assigned to Germany, and the southern to Great Britain. The German territory, called Kaiser Wilhelm's Land contains 68,785 sq. miles, the English territory 86,457 sq. miles, estimated pop. 135,000. The government of the British portion is in the hands of an administrator appointed by the crown, assisted by an executive and a legislative council. New South Wales, Victoria, and Queensland each contribute to the expense of the government. A German chartered company whose object is to develop the resources of the country has stations in German New Guinea. The Dutch have done little or nothing for their portion of the island. Estimates of the total population vary between 500,000 and 2,500,000.

NEW HAMPSHIRE, one of the United States, bounded on the north by Canada, east by Maine, southeast by the Atlantic, south by Massachusetts, and west by Vermont, from which it is separated by the river Connecticut; area, 9305 sq. miles. This state has a sea-coast of only 18 miles. It ranks fortieth in size among



Seal of New Hampshire.

the United States. New Hampshire is more mountainous than the average state on the Atlantic slope. The easternmost extension of the Appalachian system traverses the state lengthwise and culminates in the White Mountains. Among the peaks whose rocky summits reach above the timber line is Mount Washington with an altitude of 6293 feet. Every part of the state is well drained by numerous streams, the narrow western portion by the Connecticut river, the remainder by rivers flowing to the Atlantic Ocean. The northern part of the state is drained by the Androscoggin river. The principal river after the Connecticut is the Merrimac.

The Merrimac probably turns more spindles than any other river in the world. The southeastern corner of the state is drained by streams flowing into the Piscataqua estuary, this being the only harbor on the coast. New England abounds in lakes, the largest being Lake Winnipiseogee. The climate is severe, the ground being snow covered, and the rivers frozen from autumn to spring. Mica, granite, scythe stones, copper, lead, zinc, tin, arsenic, and iron are among the chief minerals of the state. The principal crops are Indian corn, oats, and barley; buckwheat, hay, hops, tobacco, potatoes, flax, beans, and pease are also raised. Apple and pear trees are abundant in the cultivated districts; and the hilly and mountainous regions are still covered with extensive forests of pine, oak, beech, birch, sugar-maple, etc. Manufactures are actively carried on, the principal being cotton, woolen, and worsted goods, boots and shoes, leather, lumber, iron, machinery, furniture, etc. The mileage of railways is greater in proportion to population and wealth than in any other New England state. Education is well attended to. There is but one university, Dartmouth college, Hanover. Earliest settlements in New Hampshire were made near Dover and Portsmouth in 1623. New Hampshire was a part of the Massachusetts colony from 1641 to 1679, from 1689 to 1692, and from 1699 to 1741. During the intervening dates and until 1775 this territory was under colonial governors of its own. The people of New Hampshire took an active part in the revolutionary war. In 1776 a provisional government was founded, and in 1784 a state constitution was adopted. New Hampshire was the ninth state to ratify the federal constitution, which it did on June 21, 1788. The popular name is Granite state. The capital of the province of New Hampshire was Portsmouth. Until 1805 it was migratory but at that date Concord was chosen. New Hampshire was federalist in national politics till 1816, with the exception of 1804, when it voted for Jefferson. From 1816 to 1852 it was consistently democratic. Since 1856 it has been staunchly republican. The capital is Concord, the largest city and the chief manufacturing center is Manchester, and the only port is Portsmouth. Pop. 443,588.

NEW HAVEN, a seaport town in Connecticut, on a bay of same name in Long Island Sound, 72 miles northeast of New York. There are important manufactories of carriages, arms, wire, etc., and there is a large foreign trade, particularly with the West Indies. New Haven is widely known as the seat of Yale College (which see). Pop. 128,117.

NEW HEBRIDES, a long chain of volcanic islands in the Pacific, lying northwest of Fiji and northeast of New Caledonia, and embracing an area of about 3000 sq. miles. The natives (70,000) are of Melanesian race.

NEW JERSEY, one of the eastern United States, bounded on the north by New York, east by the Atlantic Ocean and the Hudson river, south by Delaware and Pennsylvania, from which it is separated by the Delaware river; area, 7815 sq. miles. Though the state

lies wholly within the Atlantic slope, it is crossed in the northwest by several ranges of the Appalachian system. There are four distinctly marked topographical regions running in parallel bands across the state from southwest to northeast. The first, the Kittatinny range, an extension of the Blue Mountains of Pennsylvania, runs in a continuous ridge into New York. The second includes the Highlands, an outlying Appalachian range consisting of plateau-like masses, rising to a height of 1200 to 1400 feet. The third is the Piedmont plain, nearly as wide as the first two



Seal of New Jersey.

combined. The fourth constitutes the coastal plain and includes the entire southern half of the state south of a line running from Trenton to Newark Bay.

The western slope of the state is drained by short tributaries into the Delaware river, but by far the greater portion drains directly into the Atlantic Ocean or its inlets. The principal rivers are the Passaic and Hackensack, the Raritan, the Mullica and Great Egg. Lakes are confined chiefly to the northern section.

The most extensively utilized of the state's diversified geological resources are its clays. New Jersey ranks second in the production of pottery and third in the total output of clay products. Brick clay is found in most parts of the state. A variety of stone is quarried in the northwestern counties, and constitutes another important source of wealth. The production of granite has increased rapidly. New Jersey ranks second in the production of Portland cement. Iron has been mined continuously in the northwestern part until the present time. The iron is mined with greater difficulty than in the larger iron-producing regions, but the saving of the cost of transportation makes it profitable. The state has an extensive fishery industry. Next to oysters, the principal species with respect to value are clams, shad, squeteague, bluefish, and cod. The middle portion of the state is agreeably diversified by hills and valleys; the southern part is level and sandy, and to a great extent barren, yielding naturally little else than shrub-oaks and yellow pine. The other portions of the state have a good soil, and produce Indian corn and other cereals, buckwheat, potatoes, etc. The fruits are good, especially apples, pears, cherries, plums, and peaches. The cli-

mate is mild, and nowhere is the cold severely felt in winter except in the mountainous regions of the north, where the finest cattle are reared, and large quantities of butter and cheese made. New Jersey ranks high among the states in manufacturing and chemical industries, while in some industries, as silk, pottery, and glass, it stands first, although it is only sixteenth in population, and forty-sixth in area. It is rich in metals, especially iron and zinc. The principal seat of education is the New Jersey college, Princeton, one of the principal colleges in the United States. There is a state normal school at Trenton. The principal towns are Newark, Jersey City, Paterson, Camden, and Trenton (the capital). The territory included within the limits of the present state was settled by the Dutch from New York between 1614 and 1620. It was one of the original thirteen states of the Union.

Cornelius May ascended the Delaware in 1623, and built a fort 4 miles below the site of Camden. The Swedes, who had conquered and expelled the English colonists from that region in 1638, were in turn conquered by Peter Stuyvesant in 1655. In 1664 the territory was granted by Charles II. to the Duke of York, and by him to Sir George Carteret and Lord John Berkeley. There was no trouble with the Indians, whose titles were peacefully purchased. The proprietors soon divided the territory into East and West Jersey. In 1674 Quakers settled Salem and Burlington and in 1682 a society under Penn bought the Carteret rights in East Jersey. The two provinces were reunited in 1702; and from 1738 New Jersey had its own governors. It bore its part in the colonial wars, contributed 10,726 men to the continental army, besides militia. New Jersey suffered heavily during the revolution, and was the scene of several important campaigns and battles. The state took an active part in the war of 1812, and the civil war. The popular name is Jersey Blue State. Politically, the state has generally inclined toward the democratic party. In 1796, 1800, and 1812, it supported the federalist candidates; from 1836 to 1848 it was whig; in 1860 it gave four votes to Lincoln, and three to Douglas; in 1872 it cast its vote for Grant; and in 1896, 1900, 1904 and 1908, it went republican. Pop. 2,500,000.

NEW JERSEY, COLLEGE OF. See Princeton University.

NEW JERUSALEM CHURCH. See Swedenborgians.

NEW LEON, or NUEVO LEON, a Mexican state, bounded by Coahuila, Zacatecas, San Luis Potosi, and Tamaulipas; area, 23,626 sq. miles. It is mountainous but fertile, and lead, gold, silver, and salt are worked; chief town, Monterrey. Pop. 327,937.

NEW LONDON, a city in Connecticut, on the Thames, 3 miles from its entrance into Long Island Sound, 42 miles e.n.e. of New Haven. The seal, cod, and mackerel fisheries employ many of the inhabitants. New London is a fashionable summer resort. Pop. 20,298.

NEWMAN, John Henry, Cardinal, born at London 1801. He took part

with Keble and Pusey in originating the Oxford movement; was a leader in the propaganda of High Church doctrines, and contributed largely to the celebrated tracts for the Times. The last of these, on the elasticity of the Thirty-nine Articles, was censured by the university authorities, and was followed by Newman's resignation of his livings (1843) and secession to the Church of Rome (1845). In 1879 he was created a cardinal. He has written some remarkable works sustaining the doctrines of the Church of Rome, particularly the *Apologia pro Vita sua* (1864), and the *Reply to Mr. Gladstone* (1875) on the Vatican Decrees. He died in 1890.

NEWMAN, John Philip, American clergyman, bishop of the Methodist Episcopal church, was born in New York in 1826. In 1860 he visited Egypt and Palestine, embodying the results of this trip in *From Dan to Beersheba, or the Land of Promise as it Now Appears*. In 1872 he was appointed by President Grant inspector of consulates in Asia. In 1881 he was a delegate to the first Ecumenical Methodist Conference in London. In 1888 he was elected bishop of the Methodist Episcopal church with his official residence at Omaha, Neb. He died in 1899.

NEW MEXICO, one of the territories of the United States, bounded on the north by Colorado, east by Texas, south by Texas and Mexico, and west by the territory of Arizona; area, 122,580 sq. miles. New Mexico exceeds in size every state in the Union except Texas, California, and Montana. The surface is generally mountainous, being traversed from north to south by the Rocky Mountains. A central valley extends across the whole territory from north to south, with an average breadth of 20



Seal of New Mexico.

miles, traversed by the Rio Grande, and hemmed in either by the main chain or by ramifications of the Rocky mountains. To the south of the town of Santa Fé they average from 6000 to 8000 feet high, but in the vicinity of the town and north of it some snowy peaks rise to the height of 10,000 or 12,000 feet. The higher ranges are covered in many places with pine forests and the lower with cedars and occasional oaks. The climate is generally temperate and salubrious. The soil is often sandy, but an extensive system of irrigation canals is projected; as it is,

about half the surface consists of good average agricultural land, producing abundant crops of alfalfa, Indian corn, wheat, and pulse. Fruits are abundant, and the vine is largely cultivated. Considerable attention is paid to the rearing of cattle. There are enormous deposits of coal; and iron, lead, zinc, copper, silver, and gold are found in important quantities.

The first explorers of the region were Spanish. Santa Fé was founded between 1605 and 1616. The Indians revolted about 1680, and kept their independence for ten years. The mines were worked and towns and missions were founded. This region became a province of Mexico when that country gained its independence of Spain in 1821. A small United States force under Gen. Stephen Kearney captured Santa Fé, gained control of the whole territory, and secured its cession to the United States in 1848. The territory when originally organized in 1850 included Arizona and a part of Colorado and California. In 1850 a convention was held and a state constitution adopted, but the dread on the part of the north of another slave state prevented the admission of New Mexico. Frequent efforts to secure admission have been made since. In 1894 congress passed an enabling act, and in the fifty-seventh congress (1901-03) an act of admission passed the house, but did not reach a vote in the senate. The construction of railroads, begun in 1878, had a marked influence in its development. The popular name is the Sunshine State. Many of the inhabitants are of Mexican origin. Pop. 193,777.

NEW MEXICO, University of, a co-educational institution of higher learning at Albuquerque, New Mexico, incorporated by an act of the territorial legislature in 1889, and indicated by statute as the future state university. The collegiate, normal, and preparatory departments were opened in 1892. Science, music, art, and commercial schools were afterward added. The degrees of bachelor of arts and pedagogy, of master of arts and sciences, and of doctor of philosophy are conferred. The Hadley Climatological Laboratory is an organization for research especially with reference to the influence of the climate of the arid and plateau region of the United States upon disease.

NEW MEXICO COLLEGE OF AGRICULTURE AND MECHANIC ARTS, a coeducational state institution at Mesilla Park, N. M., established in 1889. It is supported mainly by a territorial tax and by the Morrill and Hatch funds.

NEW ORLEANS, a city and port of the United States, Louisiana, chiefly on the left bank of the Mississippi, 100 miles above its mouth. The alluvial flat on which it stands is a mere swamp, and the town is only saved from the inundations of the river by a strong levee or embankment, built along the city front, and 200 miles above and 50 miles below, extending also around the city in the rear. The nucleus of the town is built around a bend of the river, from which it derives its popular sobriquet "the Crescent City." The streets

Italy, 2,757; Austria-Hungary, 2,958; Asia, exclusive of Japan, 1,000; Spain, 1,000; Russia, 1,000; Australia, 1,000; Greece, 130; Switzerland, 1,005; Holland, 980; Belgium, 956; all others, 1,000. Of these more than half are printed in the English language.

NEWT, or **EFT**, the popular name applied to various genera of amphibians. Water-newts, or "water-salamanders" as they are sometimes termed, possess a compressed tail, adapted for swimming. These forms are oviparous, and though aquatic in their habits they are



Great water-newt.

yet strict air-breathers. The larval gills are cast off on maturity being reached, or about the third month of existence. The larval tail is retained throughout life. The male animals are distinguished by the possession of a crest or fleshy ridge borne on the back. The food consists chiefly of aquatic insects, larvæ, etc.

NEW TESTAMENT. See Bible.

NEWTON, a city in Middlesex co., Massachusetts, on the Charles river, 8 miles w. of Boston, a favorite residence, of Boston merchants. It is the seat of the Newton Theological Institution (Baptist). Pop. 36,587.

NEWTON, Hubert Anson, American astronomer and mathematician, was born at Sherburne, N. Y., in 1830. The study of the law of meteoroids and of comets and their interrelation, began with the attempt to contribute to the theory advanced by Professor Olmsted of Yale in 1833, that meteors were a part of a mass of bodies moving round the sun in a fixed orbit. His authority on these subjects became world-wide, the National Academy of Sciences awarding him the Smith gold medal. He died in 1896.

NEWTON, Sir Isaac, the most distinguished mathematician of modern times, was born at Woolsthorpe, Lincolnshire, December 25, 1642. In 1663-64 he discovered the formula known as Newton's Binomial Theorem (see Binomial); and before 1665 he had established his doctrine of fluxions. Some years later Leibnitz also discovered this invaluable method, and presented it to the world in a different form—that of the differential calculus. About this time (1665), being obliged to quit Cambridge on account of the plague, he retired to Woolsthorpe, where the idea of universal gravitation is said to have first presented itself to him, from observing the fall of an apple in his garden. In 1666 he returned to Cambridge, was chosen fellow of his college (Trinity college) in 1667, and the next year was admitted A.M. By this time, his attention had been drawn to the phenomena of the refraction of light through prisms, and to the improvements of telescopes.

His experiments led him to conclude that light is not a simple and homogeneous substance, but that it is composed of a number of rays of unequal refrangibility, and possessing different colors. In 1669, being appointed professor of mathematics at Cambridge, and preparing to lecture on optics, he endeavored to mature his first results, and composed a treatise on the subject. In 1672 Newton was chosen a fellow of the Royal Society, to which he communicated a description of a new arrangement for reflecting telescopes, which rendered them more convenient by diminishing their length without weakening their magnifying powers; and soon after, the first part of his labors on the analysis of light. This led him into controversies with Hooke, Huygens, and several eminent foreigners, Newton maintaining the corpuscular theory, now generally given up in favor of the undulatory theory. In 1675 he addressed another paper to the Royal Society, completing the account of his results and of his views on the nature of light. This treatise, united with his first paper on the analysis of light, afterward served as the base of the great work, *Treatise on Optics* (1704). He had before this deduced from the laws of Kepler the important law that gravity decreased with the square of the distance, a law to which Sir Christopher Wren, Halley, and Hooke had all been led by independent study. No demonstration



Sir Isaac Newton.

of it, however, had been given, and no proof obtained that the same power which made the apple to fall, was that which retained the moon and the other planets in their orbits. Adopting the ordinary measure of the earth's radius, Newton had been led to the conclusion that the force which kept the moon in her orbit, if the same as gravity, was one-sixth greater than that which is actually observed, a result which perplexed him, and prevented him from communicating to his friends the great speculation in which he was engaged. In June, 1682, however, he had heard of Picard's more accurate measure of the earth's diameter, and repeating with this measure his former calculations, he found, to his extreme delight, that the force of gravity, by which bodies fall at the earth's surface, 4000 miles from the earth's center, when diminished as the square of 240,000

miles, the moon's distance, was almost exactly equal to that which kept the moon in her orbit. Hence it followed that the same power retained all the other satellites round their primaries and all the primaries round the sun. Two years were spent in penetrating the consequences of this discovery, and in preparing his immortal work *Philosophiæ Naturalis Principia Mathematica*, commonly called "Newton's Principia," which was printed in 1687 at the expense of Dr. Halley. In 1687 Newton was one of the delegates sent by the University of Cambridge to maintain its rights before the High Commission Court when they were attacked by James II., and in 1688 he was elected by the university to the Convention Parliament. In 1696 he was appointed warden of the mint, and in 1699 master. In 1701 he was again returned to parliament by his university; in 1703 he was chosen president of the Royal Society; and in 1705 was knighted by Queen Anne. In his later years he took great interest in chemistry, and in the elucidation of the sacred Scriptures. His health was good until his eightieth year, when he suffered from a calculous disorder, which occasioned his death, March 20, 1727. He was interred in Westminster Abbey. The most important of Newton's philosophical works are his *Principia*; his *Arithmetica Universalis*; his *Geometria Analytica*; his *Treatise on Optics*, published in 1705; and his *Lectures Opticæ*, published after his death. His literary and theological works are his *Chronology*; his *Observations on the Prophecies of Holy Writ*, viz.: Daniel and the Apocalypse; and his *Historical Account of two Notable Corruptions of Scripture*.

NEWTON'S LAWS OF MOTION. See Dynamics.

NEW YEAR'S DAY, the first day of the year, from the earliest times observed with religious ceremonies or festive rejoicing. New Year's Day, being the eighth day after Christmas, is the festival of Christ's circumcision.

NEW YORK, "the Empire State," one of the thirteen original United States of North America, having Canada on the north and northwest, from which it is almost entirely separated by the St. Lawrence, Lake Ontario, the Niagara river, and Lake Erie; south, Pennsylvania, New Jersey, and the Atlantic; and east, Connecticut, Massachusetts, and Vermont. Long Island belongs to the state, whose seaboard otherwise is very small. Total area, 49,170 sq. miles. It is the twenty-sixth in point of size among the states. The surface in the southeast is traversed by several mountain ranges from New Jersey, one of which, crossing the Hudson, presents a bold and lofty front on both banks, and forms magnificent scenery. The Catskill mountains have the greatest average height, and in Round Top attain 3800 feet; but the culminating point is Mount Marcy, which belongs to the Adirondack group, and has a height of 5467 feet. In the west the large tract extending between Lake Ontario on the north and Pennsylvania on the south is generally level. The principal rivers are the Hudson, Delaware, Susquehanna,

Mohawk, Oswego, Genesee, Niagara, Alleghany, and St. Lawrence. The falls of Niagara partly belong to the state. Besides the frontier lakes Ontario and Erie, there are many lakes of very considerable size, such as Lakes Champlain, George, Oneida, Cayuga, Seneca, etc. The climate is somewhat variable, but with some local exceptions very healthy. The greater part of the soil is arable, and New York occupies a foremost place in agriculture. The largest crops are hay, oats, Indian corn, wheat, beans, barley, and, to a greater extent than any other state, potatoes. Grapes are grown in the Chemung Valley. A large income is annually obtained from the products of floriculture. Much attention is paid to the rearing of stock, both for feeding and for dairy purposes, more milk, butter and cheese being produced



Seal of New York.

than in any other state. The forest trees present a great variety, but the forest area, which used to include nearly half the state, has been much reduced of late years. The most important mineral is iron. Lead ore is also found, and a vast amount of salt is made from the salt springs. Granite, marbles, sandstones, limestones, clay, sand, and all building materials are abundant. The mineral springs of Saratoga are the most celebrated in America. The manufactures include nearly a sixth of all the manufactures of the United States. The foreign and internal trade are of great importance. About 60 per cent of the imports and 40 per cent of the exports of the entire nation pass through the port of New York. The internal trade is carried on chiefly by canals and railroads in conjunction with the Hudson. Of the canals the most important is the Erie Canal, which connects Lake Erie with the Hudson. The length of railways is over 9000 miles. The principal railroad systems crossing the state are the New York Central and Hudson River, the Erie, the Lackawanna, the New York, Chicago, and St. Louis (with the West Shore), the New York, Ontario and Western, and the Lehigh Valley. Other important systems enter at the east and west. Among religious denominations the Protestant Episcopalians, Roman Catholics, Episcopal Methodists, Baptists, and Presbyterians are the most important. For the higher branches of education ample provision has been made, there being some thirty universities and colleges, and primary educa-

tion is free. The oldest and most important university is Columbia in New York City. There is no state university, but Cornell university in Utica awards certain state scholarships. Other important institutions are Union college, in Schenectady, Hamilton college, Clinton, New York university at New York. Vassar college at Poughkeepsie, is one of the leading women's colleges in the country. The most noted of the fifteen theological seminaries is Union in New York City. There are seven law schools, twelve medical schools, three dental and four schools of pharmacy. Albany is the capital, though it is far below New York, Buffalo, Rochester, and Syracuse in population.

The first European discoverers and explorers found the eastern slope of the continent under the denomination of the Iroquois tribes. John Smith met with them on the north waters of Chesapeake Bay in 1607, and Hudson found them in 1609 on the banks of the river to which he gave his name. The chief seat of this powerful nation, whose sway was recognized from the St. Lawrence to the Tennessee and from the Atlantic to the Mississippi, was in the wide and fertile region of western and northern New York. They organized the political league or confederacy known as the Five Nations. These were the tribes of Mohawks, Onondagas, Cayugas, Senecas, and Oneidas. The confederacy was at the height of its power about the year 1700. In 1715 they were joined by the Tuscaroras, driven out from North Carolina, and were afterward known as the Six Nations. The American revolution proved fatal to them. The political history of the province records one continued struggle between the royal governors and the general assembly—the assembly withholding money grants, and the governors exercising the power to dissolve it at will. The quartering of British troops became a constant irritation between the people and the officers, and the need of money by the authorities caused as severe a struggle between the governors and the assembly. A general congress of the colonies held in New York in 1765 protested against the stamp act and other oppressive ordinances, and they were in part repealed. On the breaking out of hostilities, New York immediately joined the patriot cause; the English authority was overthrown, and the government passed to a provincial congress. In May, 1775, Forts Ticonderoga and Crown Point, which commanded Lakes Champlain and George, and secured the northern frontier, were captured by the Americans. New York City became the headquarters of the continental army under command of General Washington. On July 9, 1776, the provincial congress reassembled at White Plains, and formally took the name of the representatives of the state of New York. The same day they proclaimed their adhesion to the Declaration of Independence. The defeat of the Americans on Long Island, August 27, 1776, was followed by the abandonment of the city. The movement of Howe to White Plains, and his subsequent successful operations, compelled the withdrawal of the Americans

to New Jersey. In 1777 the advance of Burgoyne from Canada was checked at Saratoga and his entire army captured. An attempt of Clinton to aid Burgoyne, in which he captured the forts at the entrance to the Hudson Highlands, failed; West Point continued to command the passage of this important line of communication. On April 20, 1777, the state assembly adopted the first constitution. Gen. George Clinton was elected governor, and held the office till the close of the war. In 1779 (July 16) Stony Point was captured by the Americans. In 1780 the failure of Arnold's treason put an end to the schemes of the British to command the river. On the conclusion of the war New York was evacuated, November 25, 1783. In 1788 (July 26) New York adopted the federal constitution, became the most important member of the national union, and received popularly the name of the Empire State. The seat of government was transferred from New York City to Albany in 1797. The progress of the state met with no interruption until the war with Great Britain in 1812, when its northern frontier became the seat of operations by land and water. The treaty of Ghent put an end to the war, and important schemes for the development of the internal navigation to bring the products of the state to tidal water were rapidly consummated. Steamboat navigation began on the Hudson in 1807, and the canal system was perfected in 1825 in the completion of the Erie canal, which opened the country from the lakes to the sea. After 1840, the anti-slavery feeling was strong in the agricultural parts of the state, and in 1848 the democrats, led by Van Buren, broke away to aid in forming the free-soil party. The whigs and know-nothings gained and lost power in swift succession before the civil war. The mercantile and manufacturing classes in 1860 advocated peace at any price, but the mass of the people were Unionist. The reaction following upon the disasters of the first year and a half of the war put the democrats into power. The war measures of President Lincoln were denounced violently by the state authorities, and the election of 1864 was bitterly fought, the outcome being decided in favor of the republicans by the votes of the men at the front.

The rise of the labor party in 1886 was the cause of much important labor legislation. In 1892 laws limiting the hours of daily work and protecting women and children in factories and shops were passed. In 1867 the public schools of the state were made entirely free, and in 1875 primary education was made compulsory.

New York is an uncertain state both in national and state elections, and the influence exerted by its large electoral vote on the outcome of presidential contests has given it the well-earned name of the "pivotal state." New York voted for the republican candidates from 1796 to 1808. In 1812 it cast its vote for De Witt Clinton, who had been nominated by the section of the republican party opposed to the domination of the congressional caucus, and had been in-

dorsed by the federalists. It voted for Monroe in 1816 and 1820, divided its vote among Adams, Crawford, Clay, and Jackson in 1824 (26 out of 36 for Adams), and between Adams and Jackson in 1828 (20 out of 36 for Adams). It was democratic in 1832, 1836, 1844, and 1852, and whig in 1840 and 1848. From 1856 to 1864, it was republican, and then entered on a course of vacillation. It voted for Seymour (democrat) in 1868, Grant (republican) in 1872, Tilden (democrat) in 1876, Garfield (republican) in 1880, Cleveland (democrat) in 1884, Harrison (republican) in 1888, and Cleveland (democrat) in 1892. The state went decidedly republican in 1896, 1900, 1904 and 1908. Pop. 8,468,640.

NEW YORK, the chief city and seaport of the state of New York, and of the United States, and in respect of population and commerce the metropolis of the American continent, and after London, Eng., the largest city in the world. The city is admirably situated at the confluence of the Hudson river from the north, and the East river from the northeast (the latter a prolongation of Long Island Sound), their united waters expanding into New York bay, which forms a magnificent harbor. The approach from the sea is either by the East river and Long Island Sound, or by the wide channel between Sandy Hook and Long Island, and thence by "the Narrows" between Staten Island and Long Island. In the bay are several islands, on some of which are forts, and on one the colossal statue of Liberty, the largest statue of modern times, 151.41 feet in height, stands upon a pedestal 155 feet high. The chief portion of the city is situated on Manhattan Island, $13\frac{1}{2}$ miles long and generally about $1\frac{1}{2}$ broad, and separated by the narrow channel of Harlem river from the mainland; while on the opposite shores of the East river are Brooklyn and Long Island City, and on those of the Hudson, Jersey City, Hoboken, etc. Since January, 1898, Brooklyn, Long Island City, Staten Island, etc., have been incorporated in New York.

The plan upon which the newer portion of the city is laid out consists of parallel avenues, 100 feet or more in width, named numerically from first to eleventh, and running from south to north as far as the northern extremity of Manhattan island, intersected at right angles by streets also numerically named, and crossing the city from east to west. Fifth avenue (7 miles long, 100 feet wide) is the great central avenue, and all the streets running east from it have the prefix east, and those running west the prefix west, and the houses are numbered accordingly. The main business thoroughfare is Broadway (5 miles long and 80 feet wide), which in the activity and variety of its traffic, the elegance of its shops, and the massiveness and grandeur of many of its public and private buildings, is one of the most interesting streets in the world. Madison avenue, next east of Fifth avenue, vies with it as a street of costly private houses and beautiful churches. The streets are traversed by innumerable electric street cars, supplemented by elevated railroads with steam motors

giving a speed of 10 miles per hour; and a four track trunk line underground railroad from City Hall Park through Elm street, Fourth avenue, 42nd street and Broadway to 96th street; a two track southern extension line from the City Hall loop, through Broadway to South Ferry, whence it is to connect with the tunnel under the East river to Brooklyn. A three two track northern extension to Van Cortland Park (in operation to 219th street), to the Harlem river at 139th street and from 135th and Lennox avenue under the Harlem river and on to Bronx Park. Ferry-boats cross the Hudson and East rivers at all hours. A bridge across Harlem river and a massive viaduct take the trains of the New York Central and Hudson River R. R. to the Grand Central Depot. East river bridge, one of the largest suspension-bridges existing, connects New York with Brooklyn. This bridge, 5989 feet long and 85 wide, costing over \$20,000,000, was opened in 1883. The Williamsburg bridge with entrance at Clinton street in New York and Havemeyer street in Brooklyn, was opened in 1903; exclusive of real estate the cost was \$12,000,000. The work of construction on Manhattan bridge commenced in 1901 and the anchorages, the towers, cables and suspended superstructure are now under way. Work on Blackwell's Island bridge commenced in 1901 and the cantilever spans are now under way. The great width of the Hudson opposite the city, and the necessity of keeping it an unimpeded highway of commerce, renders piers at intervals across the river inadmissible, but a great cantilever bridge is spoken of. Considerable progress has been made in the construction of a double tunnel beneath the Hudson, by which the trains of southern and western railroads will pass under the river directly into the city. Of the public parks the most important is Central park, situated near the center of Manhattan island. Its length is $2\frac{1}{2}$ miles and its width a little more than half a mile, giving an area of 840 acres. Originally an unpromising stretch of rocky ledges and stagnant swamps, it has been made one of the most picturesque and beautiful pleasure-grounds with which any city in the world is adorned. The next important is Prospect park in Brooklyn, and the third is Bronx park, occupying an area of 661 acres on both sides of the Bronx river. More than a dozen small public parks and squares are scattered over the city, the finest of the latter being Union Square on the east side of Broadway, and Madison Square on the east side of Fifth avenue.

The circumstance that the city is hemmed in by water, and the high price of ground, have stimulated the building of very lofty structures for business premises and to some extent for dwellings. The buildings most worthy of notice, in an architectural aspect, are the treasury, in white marble with Doric porticoes; the city hall, also of white marble, in Italian style, attractively set in the center of an ornamental park; the postoffice, at the south end of City Hall park; the Academy of Design, Columbia college, numerous palatial

private houses on Fifth avenue, Madison avenue, and other streets adjacent to Central park, and several of the new "apartment houses," some of which cover entire city blocks and attain a height of 10 and 12 stories. Among the important office buildings may be mentioned the Produce Exchange, with a tower 225 feet high, the Consolidated Stock and Petroleum Exchange, the Broad-Exchange, the Equitable Life Assurance Society, the World Tribune and Times buildings. Of the newer buildings the most notable is the Flat Iron at the triangle of Broadway and Fifth avenue, a twenty story wedged shaped building visible for miles. The churches of all denominations number about 500. Of the numerous church buildings worthy of notice the most conspicuous are: Trinity church (Episcopal), on Broadway, a noble Gothic structure of brown sandstone; Grace church (Episcopal), a handsome Gothic building in white marble; St. George's (Episcopal); St. Thomas's (Episcopal); Fifth Avenue Presbyterian church, in the decorated Gothic style, on Fifth avenue; All Souls (Unitarian); St. Patrick's (R.C.) cathedral, built of white marble in the decorated style of the 13th century, the largest and most imposing church edifice in the country; the Jewish Temple Emmanuel, the finest example of Moorish architecture in the states. New York is generously provided with hospitals, asylums, and institutions of all kinds for the relief of human suffering. The public school system is very complete. By law the attendance of children from 8 to 14 years of age is made compulsory, and the schools offer a superior education free of cost to children in all grades. The most important seat of learning in the city is Columbia college, founded by charter of George II. in 1754. The college has 60 instructors and about 1500 students. The university of New York City, founded in 1831, has a large corps of instructors. Among the public monuments are statues of Washington, Lincoln, Farragut, Franklin, Shakespeare, Burns, Scott, etc., an ancient Egyptian obelisk presented by the Khedive of Egypt; Bartholdi's great Statue of Liberty. Among the numerous public libraries may be noted the Astor Free library, containing 250,000 volumes; the Mercantile library, with 210,000 volumes, a fine circulating library belonging to its members, but accessible also to others; the Lennox library, with a collection of rare books numbering 30,000 valuable manuscripts, choice paintings, sculptures, ceramics, etc. Theaters and other places of amusement are numerous, the principal ones being the Metropolitan Opera House, the Broadway, the Casino, the Criterion, Daly's, the Knickerbocker, the Empire, the Herald Square, the Garrick, Wal-lacks, the Savoy, the Victoria, Belasco's, the New York, the Majestic. New York has about 40 hotels that may be ranked as first-class. The largest and best known is the Waldorf-Astoria. Among the others are the Buckingham, the Holland, the Murray Hill, the Manhattan, the Netherland, the Savoy, the Fifth Avenue, the Hoffman, the Imperial.

The most luxurious restaurants in the city are Delmonico's and Sherry's. In summer there is a great exodus to watering-places and other adjacent pleasure resorts.

New York is primarily a commercial city and a center of distribution of domestic and foreign products, but it is also the center of a vast manufacturing interest. The industries, however, are more of a varied character than individually important, the chief being connected with clothing, meat-packing, printing and publishing, brewing, etc. Immense numbers of immigrants from Europe arrive here. The water supply is furnished from Croton Lake, an artificial reservoir supplied by Croton river, from which the water is conveyed by an aqueduct of stone masonry of a capacity of 115,000,000 gallons per day a distance of 40 miles to New York.

By the act of 1897, under which Greater New York was constituted, the whole city is under a mayor, elected for four years, who appoints heads of departments; a president of the council, elected for four years also, who acts as deputy-mayor; and a council and board of aldermen. Each of the five constituent boroughs (Manhattan, Bronx, Queens, Brooklyn, Richmond) has its own president and borough board.

The first regular line of packet ships to Liverpool was started in 1817. The opening of the Erie Canal in 1825 gave a great stimulus to internal commerce. Since that date the progress of New York has been wonderful. Pop. in 1830, 202,589; in 1850, 515,547; in 1870, 942,292; in 1880, 1,206,600; in 1890, 1,513,501; in 1900, 3,437,202, and in 1909 over 4,400,000.

NEW ZEALAND, a group of islands belonging to Great Britain in the South Pacific Ocean. Pop. 818,973.

With mineral wealth New Zealand is liberally supplied. Coal is obtained in many parts, and copper has been worked on a small scale. Gold is worked both in North and South Island. It was first practically discovered in 1861, and is obtained in two forms, namely, as veins in quartz reefs, and as alluvial gold. Extending through 12° of latitude, and having a greatly diversified surface, New Zealand has necessarily a very varied though a remarkably healthy climate. In temperature it resembles France and North Italy, but the humidity is considerably greater.

The original natives of New Zealand, called Maoris, a people of Polynesian origin, are supposed to have emigrated from the Navigators' or the Sandwich Islands some centuries ago. Split up into numerous petty tribes, and wasting each other by internecine feuds, their numbers have been so reduced that they do not now much exceed 40,000. Stock-rearing and agriculture are the most important industries, though mining is also an important occupation. There are about 20,000,000 sheep and the most important export is wool, frozen meat being the next largest export. Gold is another valuable export. New Zealand was first discovered by Tasman in 1642, but little was known of it till the visits of Cook in 1769 and 1774. The first permanent settlement was

made by missionaries in 1815, but no regular authority was established by the British government till 1833, when a resident was appointed, with limited powers, and subordinate to the government of New South Wales. In 1840 New Zealand was erected into a colony; in 1841 it was formally separated from New South Wales and placed under its own independent governor; and in 1852 it received a constitution and responsible government. In 1873 the Public Works Policy was inaugurated, and large loans were raised for immigration, harbors, railways, roads, etc. In 1876 the provinces were abolished; the colony was divided into 63 counties, and all government centralized at Wellington.

NEY (nā), Michel, Duke of Elchingen, Prince of the Moskwa, marshal and peer of France, was born in 1769 at Sarrelouis, in the department of the Moselle. He entered the military service in 1788 as a private hussar, and rose by degrees to the rank of captain in 1794, adjutant-general in 1796, general of division in 1798, and as such he distinguished himself in the Rhine campaign. Appointed marshal of the empire by Napoleon in 1805, he achieved victory over the Austrians at Elchingen, and took part in the battle of Jena. During the Russian campaign he commanded the third division at the battle of the Moskwa, and conducted the rear-guard in the disastrous retreat. In the campaign of 1813 his skill and courage decided the victory of Lützen, and assisted at Bautzen and Dresden. When Napoleon abdicated and the Bourbon dynasty was established Ney took the oath of allegiance to the king and received a command; but when the emperor landed from Elba his old general joined him at Lyons and opened the way to Paris. In the campaign which followed it was Ney who led the attack on the British center at Waterloo, and after five horses had been killed under him he only retired from the field at nightfall. When the allies entered Paris he escaped in disguise to the provinces, but was finally arrested, brought back to Paris, tried for treason, and found guilty. The sentence was executed 7th December, 1815.

NGANHWUY (ngán-hwí'), province of China, bounded by the provinces of Kiangsu, Honan, Hupeh, Kiangsi, and Chekiang. Pop. 20,596,988. Capital Ngan-king-foo, on the left bank of the Yang-tse-kiang; pop. 40,000.

NIAG'ARA, a river of North America, separating Ontario from the state of New York, and conveying the waters of Lake Erie into Lake Ontario. It is 33½ miles long, and varies in breadth from 1 to 4 miles, being about the former where it issues from Lake Erie, near the city of Buffalo. It is occasionally interspersed with low wooded islands, the largest of which, Grand Island, has an area of 17,000 acres. The total descent in the river's course between the two lakes is 331 feet. About 15 miles from Lake Erie a sudden narrowing and descent in the channel causes what are called the Rapids, below which the river, here divided by Goat Island, is precipitated over the celebrated Falls. The rush of the river is such that the water

is shot a clear 40 yards from the cliff, leaving a narrow pathway for a short distance below for the adventurous. The cataract on the south side of the island, called the American Fall, is 162 feet high, width 1125 feet; that on the Canadian side, called the Great or Horse-shoe Fall, is 149 feet high, width 2100 feet. Below the falls the river rushes with great velocity down the sloping bottom of a narrow chasm for a distance of 7 miles. About 3 miles below the falls a sudden turn in the channel causes the water to whirl in a



Niagara Falls, from the U. S. side.

vast circular basin before renewing its journey. Logs and other floating material sometimes continue whirling here for many days. About one-eighth of a mile below the falls a suspension bridge 1190 feet long and 190 feet above the water crosses the river, and another 245 feet above the water has been constructed for railway and ordinary passenger traffic about 2 miles below the falls. An international reservation of the land round the falls, to be preserved in a state of nature, was effected in 1885.

NIAGARA FALLS, a city in Niagara co., N. Y., 22 miles north by west of Buffalo; on the Niagara river, and on the Erie, the Michigan Central, the Lehigh Valley, the New York Central and Hudson River, the West Shore, the Grank Trunk, and the Wabash railroads. The New York State Reservation here, which includes Prospect park, is 107 acres in extent; and there are three notable bridges connecting with Canada, one cantilever and two steel arch bridges. It is developing into an important manufacturing center, its growth being due to the utilization of the extraordinary power of the Niagara river, and falls. Pop. 22,173.

NIAS, an island in the Malay Archipelago, lying west of Sumatra; length about 70, breadth about 20 miles. Rice, sugar, and pepper are grown extensively. It belongs to the Dutch. Pop. 100,000.

NIBELUNGENLIED (nē'bē-lung-ēn-lēt; "Lay of the Nibelungen"), German epic written in the Middle High German dialect, and dating from about the 12th century. It is divided into thirty-nine sections, contains some 6000 lines, and is constructed in four-lined rhymed



stanzas. The tale, briefly told, is this: Kriemhild lives with her brother Gunther, king of Burgundy, at Worms. To his court comes Siegfried, son of Siegmund, king of the Netherlands. This Siegfried is possessed of the Nibelungen gold hoard, a magic sword, a cloak of darkness, besides great strength and courage. Thus equipped he comes to the court and wins the love of Kriemhild. In gratitude for his success Siegfried undertakes to assist Gunther, the brother of his bride, in his efforts to win the hand of Brunhild, an Icelandic princess. Together they sail for the far north, and there Gunther succeeds, with the help of Siegfried's cloak of darkness, in winning the three test games of skill which the lady played with him. Still on the bridal night the princess mocked at Gunther her husband, wrestled with him, bound him, and hung him up scornfully against the wall. But the next night Gunther, with the invisible help of his friend Siegfried, overcomes the bride, and the latter carries away her girdle and ring. Siegfried and his wife Kriemhild next appear on a visit to the Burgundian court at Worms, where Gunther the king now resides with his wife Brunhild. While there the two ladies quarrel, and in her rage Kriemhild taunts Brunhild with having had dealings with her husband Siegfried, and in proof thereof she produces the ring and girdle which he took from her chamber on the bridal night. Brunhild bitterly resents this calumny and meditates vengeance. This she accomplishes by the hand of Hagen, one of her husband's warriors, who slays Siegfried in his sleep. With rage and grief in her heart the widowed Kriemhild broods over the possibility of revenge. Thirteen years pass and then Kriemhild marries Etzel, king of the Huns. Again thirteen years pass, and then at her instigation Etzel invites Gunther and Hagen with 10,000 warriors to visit the capital of the Huns. This they accept, and while they are seated at a great feast the Burgundians are all massacred by the Huns, with the exception of Gunther and Hagen. These two are delivered up to Kriemhild, who completes her vengeance by slaying them both, while she in her turn is killed by a Hunnish warrior who is enraged at her cruelty. This epic has been produced in modern German by Simrock, Bartsch, and Gerlach, and translated into English by Birch and Lettsom, while a resumé will be found in one of Carlyle's miscellanies.

NICARAGUA, a republic of Central America, extending from the Pacific Ocean to the Caribbean Sea, and having on the north and northeast the state of Honduras, and on the south Costa Rica; area, about 49,500 sq. miles. Veins of silver, copper, and gold occur. The climate is on the whole healthy, the interior and mountainous parts being more dry and cool than on the coasts. The vegetable productions include indigo, sugar, coffee, cacao, cotton, corn, rice, etc. Fruits of various kinds are plentiful. One of the principal sources of wealth consists in cattle, of which there are great numbers, the high plains affording excellent pasturage. The capital is Managua. In 1821

Nicaragua joined Guatemala, Costa Rica, Honduras, and San Salvador in revolting against Spain, and after a sanguinary civil war it achieved independence. It has been the scene of various revolutions and counter-revolutions. The republic is governed by a president elected every four years, a senate and a house of representatives elected by universal suffrage. The principal exports are caoutchouc, coffee, hides, dye-wood, and indigo. Corinto on the Pacific and San Juan del Norte or Greytown on the Caribbean Sea are the

adopted by the council in its later form known as the Nicene Creed (which see). The council of 787 was summoned by the Empress Irene, with the concurrence of the pope, and it decreed that images were to be used as aids to devotion.

NICENE CREED, a summary of Christian faith adopted by the Council of Nice against Arianism A.D. 325, altered and confirmed by the Council of Constantinople, A.D. 381. Its characteristics are the insertion of the term "of one substance with the Father," directed against the Arian heresy; the insertion



chief ports. The population, which consists in great part of Indians and half castes, is estimated at 480,000.

NICARAGUA, Lake of, an extensive sheet of water in Central America, in the state of same name, 90 miles long northwest to southeast; greatest breadth, 40 miles; mean, 30 miles; 110 feet above the Pacific from which it is separated by a strip of land 12 miles wide.

NICARAGUA CANAL, a canal that is to be constructed for the purpose of providing a waterway for ships across Central America from the Pacific to the Atlantic, passing through Nicaragua, and utilizing Lake Nicaragua and the San Juan river. A beginning has recently been made, and the total length of the route will be 170 miles from Greytown on the Caribbean sea to Brito on the Pacific. Of this 64½ miles will consist of free navigation in the San Juan river, and 56½ of free navigation in Lake Nicaragua, total 121 miles. There will be 16 miles of excavation on the east side, 11½ miles on the west, with ¾ mile for six locks, making a total excavation of 28 miles. In basins now existing or to be constructed by means of dams and embankments there will be navigation for 21 miles. Besides the six locks on the west side there will be three on the east. The work is now at a stand-still, and how it will be completed remains to be seen.

NICE (nēs), a city and seaport of France, on the Mediterranean, capital of the department of Alpes Maritimes. The exports consist principally of oil, wine, and silk, with essences, perfumes, etc. Nice belonged to Italy previous to 1860. Pop. 125,099.

NICE, Councils of, ecclesiastical councils held at Nice or Nicæa, in Asia Minor in 325 and 787. The object of the first Council of Nice, which was convened by Constantine, was to settle the controversies which had arisen in regard to the doctrine of the Trinity. The session lasted about two months. A creed was

of the words "and the Son;" and the omission of the clause "He descended into Hell." It is recited both in the Roman Catholic and in the Anglican Church liturgies.

NICHOLAS I. (Nikolai Pavlovich), Emperor of Russia, third son of the Emperor Paul I., was born 1796, died 1855. He ascended the throne in 1825. He made war with Persia in 1827-28; joined in the Treaty of London, which secured the independence of Greece; and made one of the allied powers who destroyed the Turkish fleet at Navarino in 1827. This affair led to war between Russia and Turkey, in which the latter was defeated, paid indemnity, and signed the treaty of peace at Adrianople in 1829. He suppressed the Polish insurrection which broke out in the following year with relentless severity. In 1848 Nicholas assisted Austria with an army corps in putting down the rising in Hungary. Early in 1852 began the Russian effort to take over the holy places and assume the protectorate of the Christians in Palestine. This led to the Crimean war, before the close of which Nicholas died from lung disease.

NICKEL, a metal of a white color, of great hardness, very difficult to be purified, always magnetic, and when perfectly pure malleable and ductile. It unites in alloys with gold, copper, tin, and arsenic, which metals, it renders brittle. With silver and iron its alloys are ductile. Nickel is chiefly found in the United States, New Caledonia, and Germany; nickel is extracted from several pyrites, compounds of nickel, cobalt, antimony, arsenic, sulphur, or iron. The salts of nickel are mostly of a grass-green color, and the ammoniacal solution of its oxide is deep blue. Nickel mixed with brass in varying proportions is now well known and largely used as German silver or nickel silver. Another important use of the metal is for coating articles by the electro-plate process. See Nickel-plating.

NICKEL-PLATING is the process by which a coating of nickel is placed upon another metal, and the essentials of the process, as in electro-plating, are a proper solution of the metal and an electric battery.

NICOT (nē-kō), Jean, born 1530, died 1600; was French ambassador at the court of Portugal, where he was presented with some seeds of the tobacco plant, which he introduced into France about 1560. The botanical term for tobacco (*Nicotiana*) is derived from his name.

NIC'OTINE, a volatile alkaloid, base obtained from tobacco. It forms a colorless, clear, oily liquid, which has a strong odor of tobacco. It is highly poisonous, and combines with acids, forming acrid and pungent salts.

NICTITATING MEMBRANE, or "THIRD EYELID," a thin membrane by which the process of winking is performed in certain animals, and which covers and protects the eyes from dust or from too much light. It is chiefly found in birds and fishes, and is represented in a rudimentary condition in man, and higher mammals generally, by the "semi-lunar folds," situated at the inner or nasal angle of the eye.

NIEBELUNGENLIED. See Nibelungenlied.

NIEL (ni-el), Adolphe, French marshal, born 1802, died 1869. He took part in the expedition against Constantine in Algeria; assisted as head of the staff of engineers at the siege of Rome in 1849 during the revolutionary movement under Garibaldi; commanded the engineers and planned the operations against Sebastopol in 1854-55; distinguished himself in the Italian campaign of 1859, and was thereafter made a marshal of France by Napoleon III.

NIEVRE (nyāv'r), a department of Central France, bounded by Yonne, Cher, Allier, Saône-et-Loire, and Côte-d'Or; area, 2631 sq. miles. Pop. 347,645.

NIGER, the name of a great river of Western Africa, which rises north of Sierra Leone and Liberia, flows north and northeast, afterward turns southeast and south until, by various channels, it enters the Gulf of Guinea, its total length being about 2600 miles.

NIGHT-BLINDNESS, a defect of vision in which the eyes can see only in daylight and not by artificial light.

NIGHT-HAWK, a species of goat-sucker, a bird universally known in the

sects. The other American species are the "chuck-will's widow" and the "whip-poor-will," both of which, like the night-hawk, arrive in May, and leave in September.

NIGHT-HERON, a wading bird of several species belonging to the family Ardeidæ. The species occur in Europe, Asia, Africa, and America. It is about



Night-heron.

20 inches in length, and has three long narrow feathers proceeding from the nape of the neck, and hanging backward.

NIGHTINGALE, a well-known passerine bird of the thrush family. The nightingale sings at night, and its famed chant is the love-song of the male, which ceases when the female has hatched her brood. It is a native of many parts of Europe and Asia, and of the north of Africa. It is migratory, extending its summer migrations as far north as the



Nightingale.

south of Sweden. It feeds on caterpillars and other larvæ, frequents hedges and thickets, and builds its nest on the ground or near it, laying four or five eggs of a blue color. The young are hatched in June, and are prepared to accompany their parents in their southward migration in August. It is solitary in its habits, and its coloring is very inconspicuous.

NIGHTINGALE, Florence, was born at Florence 1823. During the Crimean war (1854) the hospital accommodation was found to be very defective, and Miss Nightingale promptly volunteered to organize a select band of nurses at Scutari. The offer was accepted by the war office, and within a week Miss Nightingale was on her way to the east, where she rendered invaluable service to the sick and wounded by her incessant labors in nursing and hospital reform. The strain, both mental and physical, which this work demanded permanently injured her health to a serious extent. A sum of \$250,000 was

raised by public subscription in recognition of her services, and this she devoted to the founding of an institution for training nurses, attached to St. Thomas's Hospital, London.

NIGHTMARE, a state of oppression or feeling of suffocation which sometimes comes on during sleep, and is accompanied by a feeling of intense anxiety, fear, or horror, the sufferer feeling an enormous weight on his breast and imagining that he is pursued by a phantom, monster, or wild beast, or threatened by some other danger from which he can make no exertion to escape. The sufferer awakens after a short time in a state of great terror, the body often covered with sweat. The proximate cause of nightmare is said to be irregularity of the circulation in the chest or brain, and the disorder is generally due to repletion and indigestion, but sometimes to the fact of the sufferer lying in an awkward position in bed.

NIGHTSHADE, the name of various species of plants, chiefly of the genus to which the potato belongs. The root and leaves of woody nightshade are narcotic, and have been applied to various medicinal uses. The berries, if not absolutely poisonous, are suspicious. The common nightshade is fetid and narcotic, and has also been employed medicinally. Deadly nightshade is *Atröpa Belladonna*. (See *Belladonna*.)

NIGRITIA. See Soudan.

NI'HILISTS, the name at first applied specifically to the revolutionary party in Russia who accepted the destructively negative philosophy of Bakunin and Herzen, but now applied indiscriminately to Russian revolutionists. This name was given to the party by Tourgenieff in his stories of Russian society, and accepted by them as descriptive of their character. Their object was to destroy all forms of government, overturn all institutions, annihilate all class distinctions, sweep away all traditions. They left to future generations the task of constructing society out of the ruins left by their relentless destructive policy. For some years this propaganda was spread in printed and oral forms among the newly enfranchised serfs by thousands of young people of both sexes. About 1874, however, the Russian government began to interfere, the newspapers which advocated the Nihilist doctrine were suppressed, foreign pamphlets seized, and large groups of the revolutionists summarily tried and condemned to death and exile. Hitherto the Nihilists had spread their principles by peaceful means, but after the trial in 1877, in which 99 persons were sent to Siberia, a secret and sanguinary struggle between armed assassins and the government began. The first startling indication of the new departure was the murder of General Trepoff by a young woman named Vera Sassulitch, and this was followed by the assassination of Generals Mezentzoff and Drenteln, Prince Krapotkin, and Commander Heyking. The incendiary followed the assassin. In June, 1879, no fewer than 3500 fires broke out in St. Petersburg and other large towns, most of which were attri-



Common night-hawk.

United States, 9½ inches in length and 23 in extent of wing. It is a bird of strong and vigorous flight, and its prey consists of beetles and other large in-

buted to the Nihilists. Various attempts were made to assassinate the emperor. Four shots were fired at him by Solovieff, a train in which he was supposed to travel was wrecked by Hartmann, an apartment in the Winter Palace at St. Petersburg was blown up, and at last, in March, 1881, Alexander II. was murdered by a bomb thrown beneath his carriage in the street near the palace. Several other murders followed, and also attempts on the life of Alexander III. Latterly, however, their activity has chiefly found expression in spreading socialism among the workmen of the towns, and is not strictly Nihilistic.

NIIGATA (nē-i-gā'tā), the chief town of the province of Echigo, Japan, situated on the west coast of the island of Hondo and on the left bank of the Shinano. This port was opened to foreign trade by the treaty of 1860. The town is well built, the streets are traversed by canals, there is an hospital and a college, and a considerable coasting trade. Pop. 53,366.

NIJNI-NOV'GOROD (nizh'nē), a town in Russia, capital of the government of same name, at the confluence of the Oka and Volga, 255 miles east of Moscow. Pop. 95,124.—The province has an area of 19,704 sq. miles. Pop. 1,482,471.

NILE, a great historic river in Africa, the main stream of which, known as the Bahr-el-Abiad, or White Nile, has its chief source in the equatorial lake Victoria Nyanza. What is known as the Bahr-el-Azrek, or Blue Nile, a much smaller stream, joins the White Nile at Khartoom, lat. 15° 40' n. The source of the Blue Nile was discovered in the Abyssinian Highlands by Bruce in 1770, while the source of the other, or true Nile, was for long the subject of speculation and exploration. The discoveries, however, of Speke and Grant in 1861-62, and of Sir Samuel Baker in 1863-64, and subsequent explorers, have established the fact that the headwaters of the Nile are collected by a great lake situated on the equator, called Ukerewe or Victoria Nyanza. The Nile, near where it flows out of Lake Victoria, forms the unimportant Ripon Falls, then flows generally northwest; about lat. 1° 40' n. it expands into Lake Ibrahim Pasha, afterward forms the Falls of Karuma and the Murchison Falls, and then enters another lake, the Albert Nyanza, at an elevation of about 2550 feet. This lake, as was first definitely ascertained by Stanley, receives the waters of another lake further to the southwest, Lake Muta Nzige or Albert Edward, the channel of communication being the river Semliki. From the Albert Nyanza to the Mediterranean the general course of the Nile is in a northerly direction, with numerous windings. Above Gondokoro, about lat. 5° n., the river forms a series of cataracts; but between these falls and the Albert Nyanza, a distance of 164 miles, the river is broad, deep, and navigable. Not far below Gondokoro the Nile begins to flow more to the west till it reaches lat. 9° n., where it receives the Bahr-el-Ghazal, one of its chief tributaries. On receiving this affluent it turns due east for about 100 miles, and then after receiving the Sobat from the south-

east flows almost due north to Khartoom. It receives its last tributary, the Atbara, from the Abyssinian frontier, for the rest of its course (some 1500 miles) being fed by no contributory stream. Between this point and the frontiers of Egypt occur several rapids or cataracts presenting greater or less obstacles to navigation, there being also another cataract some distance below Khartoom. In Egypt, at the head of the Delta near Cairo, it divides into two main branches, leading down respectively to Rosetta and Damietta, where they enter the Mediterranean. As rain scarcely ever falls in the greater part of the valley of the Nile the river owes its supplies to the copious rains and the vast lake areas of the tropical regions in which it takes its rise, and its volume thus depends upon the season. It begins to increase in June, attains its greatest height about September, and then subsides. The ordinary rise at Cairo is about 25 feet. During the flood a great portion of the Delta, and of the valley higher up, is inundated. This annual inundation, now controlled by the great Assouan dam and other works, with all the bounty which it brings, is watched and waited eagerly, and in ancient times caused the Nile to be worshipped as a god alike by Egyptians, Greeks, and Romans. Its length is nearly 4200 miles, or rather less than that of the Mississippi-Missouri.

NILE, Battle of the. See Aboukir.

NILSSON, Christine, born at Hassaby, near Wexjö, in Sweden, 1843. In 1857 her talent attracted the attention of a wealthy gentleman, who had her educated as a singer at Stockholm, and afterward at Paris. In 1864 she made her first appearance as Violetta in La Traviata at the Théâtre Lyrique, Paris, and she appeared in 1867 for the first time at Her Majesty's Theater, London. On several occasions she has visited America with the utmost success. Among her most famous impersonations are Ophelia in Thomas's Hamlet, and Margaret in Gounod's Faust. In 1872 she married M. Auguste Rouzaud, who died in 1882; in 1886 she married Count A. de Miranda.

NIMBUS, a term applied in art, especially in sacred art, to a kind of halo or disc surrounding the head in representations of divine or sacred personages; as also to a disc or circle sometimes depicted round the heads of emperors and other great men. The nimbus in representations of God the Father is of a triangular form, with rays diverging from it all round, or in the form shown in the cut; the nimbus in representations of Christ contains a cross more or less enriched, that of the Virgin Mary consists of a circlet of small stars, and that of angels and saints is a circle of small rays. When the nimbus is depicted of a square form it indicates that the person was alive at the time of delineation. Nimbus is frequently confounded with aureola and glory.

NIMES, or **NISMES** (nēm), a city of Southern France, capital of the department of Gard, 62 miles northwest of Marseilles. Nimes is chiefly remarkable for its Roman remains, including an ancient temple, with thirty beautiful

Corinthian columns, now serving as a museum and known as the Maison Carrée; the amphiheater, a circus capable of seating 20,000 persons; the temple of Diana; the ancient Tour Magne, on a hill outside of the city, supposed to have been a mausoleum; and a Roman gateway. In the 16th century it became a stronghold of Calvinism, and suffered much during the civil wars, as also by the revocation of the Edict of Nantes,



The nimbus as variously represented in sacred and legendary art.—1, God the Father. 2 and 3, Christ. 4, Charlemagne. 5, Emperor Henry II.

and during the revolution; but latterly it has become a busy manufacturing center. Pop. 80,355.

NIMROD, described in Gen. x. 8 to 12 as a descendant of Ham, a son of Cush, a mighty hunter before the Lord, and the beginning of whose kingdom was Babel, Erech, Accad, and Calneh in the land of Shinar.

NINEVEH, an ancient ruined city, formerly capital of the Assyrian Empire, in Asiatic Turkey. The first recorded notice of Nineveh is in Genesis x. Again it is spoken of in the book of Jonah as a "great city." It remained the capital of Assyria till about 606 B.C., when it was taken and burned by the Babylonian Nabopolassar and the Median Cyaxares. It was maintained as a local tradition that this ancient capital of Assyria lay buried on the left bank of the Tigris opposite Mosul; but the fact was not definitely settled until in 1841 M. Botta began excavations in the vast mounds which there existed. He was followed in this by Mr (afterward Sir Henry) Layard, who explored a great portion of the large angle formed by the Tigris and the Zab. In the mounds of Koyunjik opposite Mosul he excavated the palaces of Sennacherib, Assurbanipal, and Esarhaddon. The walls of the city, which the inscriptions describe as Ninua, stretch along the Tigris for 2½ miles, and the elaborate outworks, moats, and defenses can still be traced. The important discoveries made by Layard were continued by Loftus, Hormuzd Rassam, and G. Smith, and the result of their labors deposited in the British Museum. See Assyria.

NINGPO, a large city of China, in the province of Che-kiang, one of the ports open to foreign commerce. The principal exports are tea, silk, and raw

cotton; and the principal imports, sugar and opium. Pop. 240,000.

NIOBE, in Greek mythology, the daughter of Tantalus, married to Amphion, king of Thebes. Proud of her numerous progeny, she provoked the anger of Apollo and Artemis (Diana), by boasting over their mother Leto (Latona), who had no other children but those two. She was punished by having all her children put to death by those two deities. She herself was metamorphosed by Zeus (Jupiter) into a stone which shed tears during the summer. This fable has afforded a subject for art, and has given rise to the beautiful group in the tribune at Florence, known by the name of Niobē and her Children.

NIOBIUM, or **COLUMBIUM**, a rare metal discovered in 1801 in a black mineral called columbite from North America. It forms a black powder insoluble in nitric acid, but readily soluble in a mixture of nitric and hydrofluoric acids.

NIP'IGON, or **NEP'IGON** a lake of Canada, in Ontario, about 30 miles northwest of Lake Superior. It is about 70 miles long and 40 miles broad, with rugged headlands, deep bays, and many islands. It is connected with Lake Superior by the Nipigon river.

NIPIS'SING, Lake, a lake of Canada, in Ontario, n.e. of Lake Huron, irregular in coast-line; breadth, about 30 miles; length, 48 miles. It contains numerous islands, and finds its only outlet by French river into Lake Huron.

NIPPLE. See Mammary Glands.

NIRVA'NA. See Buddhism.

NITRATE, a salt of nitric acid. The nitrates are generally soluble in water, and easily decomposed by heat. Deposits of nitrates are present in small quantities in almost all soils, but enormous accumulations exist in Chile and Peru. These latter deposits, which are known as Chile saltpeter, cubic nitre, or nitrate of soda, are found near the coast, and are probably produced from remains of marine animals and birds. The great value of this nitrate is in its application to agriculture as a fertilizer on impoverished soil; for it is now well known that crops require large quantities of nitrogen to secure their full development. It has been found by experiment, for instance, that with a soil poor in nitrogen the crop of wheat per acre was 2090 lbs., whereas when the same soil was dressed with nitrogenous manure, the return was 6982 lbs. So also with potatoes, the poor soil yielded 4452 lbs. as compared with 17,192 lbs. when dressed with nitrate. The nitrates, of which nitrate of soda is now considered the best, should not be used on light porous soils where the rain will sink the manure below the range of the roots. They make an excellent top-dressing in the spring, especially for root-crops.

NITRATE OF SILVER, a substance obtained by cooling, in the shape of tabular crystals, from the solution produced when silver is oxidized and dissolved by nitric acid diluted with two or three times its weight of water. When fused the nitrate is of a black color, and it may be cast into small sticks in a mould; these sticks form the lunar

caustic employed by surgeons as a cautery. It is sometimes employed for giving a black color to the hair, and is the basis of the indelible ink for marking linen. Its solution is always kept in the laboratory as a test for chlorine and hydrochloric acid.

NITRATE OF SODA, a salt analogous in its chemical properties to nitrate of potash or nitre. It is largely used as a manure, and as a source of nitric acid and nitre. See Nitrate.

NITRE, a salt, called also saltpetre, and in the nomenclature of chemistry nitrate of potassium or potassic nitrate. It is produced by the action of microbes in soils containing potash and nitrogenous organic matters, and forms an efflorescence upon the surface in several parts of the world, and especially in the East Indies, whence much nitre is derived. In some parts of Europe it is prepared artificially from a mixture of common mould or porous calcareous earth with animal and vegetable remains containing nitrogen. It is also manufactured on a large scale by crystallization from a hot solution of chloride of potassium and nitrate of soda. It is a colorless salt with a saline taste, and crystallizes in six-sided prisms. It is employed in chemistry as an oxidizing agent and in the formation of nitric acid. Its chief use in the arts is in the making of gun-powder. It also enters into the composition of fluxes, and is extensively employed in metallurgy; it is used in the art of dyeing, and is much employed in the preservation of meat and animal matters in general. In medicine it is prescribed as cooling, febrifuge, and diuretic. Cubic nitre. See Nitrate.

NITRIC ACID, the most important of the five compounds formed by oxygen with nitrogen. When pure it is a colorless liquid, very strong and disagreeable to the smell, and so acid that it cannot be safely tasted without being much diluted. It is known in the arts as aqua fortis, and is commonly obtained by distilling nitre (potassium nitrate) or Chile saltpetre (sodium nitrate) with strong sulphuric acid. Nitric acid contains about 76 per cent of oxygen, a great part of which it readily gives up to other substances, acting thus as a powerful oxidizer. Thus many metals—such as copper, tin, silver, etc.—when brought into contact with this acid are oxidized at the expense of the acid with the production of lower oxides of nitrogen and an oxygenated metallic salt. Nitric acid, when moderately dilute, acts on organic bodies so as to produce a series of most useful substances, notably acetic, oxalic, and picric acids, isatin or white indigo, etc. Nitric acid is employed in etching on steel or copper; as a solvent of tin to form with that metal a mordant for some of the finest dyes; in metallurgy and assaying; also in medicine, in a diluted state, as a tonic and as a substitute for mercurial preparations in syphilis and affections of the liver; and also in form of vapor to destroy contagion.

NITRO-BENZOL, a liquid prepared by adding benzol drop by drop to fuming nitric acid. It closely resembles oil of bitter almonds in flavor, and is largely employed as a substitute for that oil in

the manufacture of confectionery and in the preparation of perfumery. It is important as a source of aniline.

NITROGEN, an important elementary principal, the basis of nitric acid and the principal ingredient of atmospheric air. The name nitrogen was applied to it by Chaptal, because of its entering into the composition of nitre, nitric acid, etc. The atmosphere contains about four-fifths of its volume of nitrogen, the rest being principally oxygen; nitre contains nearly 13 per cent, and nitric acid about 22 per cent by weight of this substance. Nitrogen is inodorous, tasteless, incumbustible, and a very inert substance in itself, although many of its compounds, such as nitric acid and ammonia, are possessed of great chemical activity. By reason of its inertness and general slowness of chemical action it acts the part of a diluent of oxygen in the atmosphere. Having no marked action of its own on living beings, its admixture with the oxygen of the air serves to moderate the otherwise too violent action of the latter gas. Under certain circumstances nitrogen may be induced to combine with other elements, especially with hydrogen, oxygen, and carbon, with titanium, tantalum, and tungsten. Nitrogen is allied in many of its chemical properties to the other elementary substances—phosphorus, arsenic, antimony, and bismuth; and it has the power of combining with one, three, or five atoms of a monovalent element or radicle. The oxides of nitrogen are five in number. The first oxide of nitrogen (nitrogen monoxide) contains 28 parts by weight of nitrogen united with 16 parts by weight of oxygen. The next oxide (dioxide) contains 28 parts by weight of nitrogen united with 32 parts by weight of oxygen. In the third oxide (trioxide) 28 parts of nitrogen is united with 48 parts of oxygen while the fourth and fifth oxides (tetroxide, pentoxide) contain respectively 64 and 80 parts of oxygen, united in each case with 28 of nitrogen. These oxides may be all produced from nitric acid. The trioxide forms a dark-blue liquid, which, when added to water at 0°, combines therewith, forming nitrous acid. This solution acts as a reducing agent, inasmuch as it eliminates gold and mercury as metals from several of their salts; on the other hand, it also exercises an oxidizing action on such salts as ferrous sulphate, potassium, iodide, etc. By replacement of the hydrogen in nitrous acid a series of metallic salts is obtained, called nitrites. Nitrogen monoxide is better known by the name of "laughing-gas," from the peculiarly exhilarating effect which it produces when breathed along with a little air. If the gas be pure, its inspiration soon brings about total insensibility, which does not continue long, and generally produces no bad effects upon the person who breathes it; hence it is much used as an anæsthetic in minor surgical operations, such as teeth-drawing, etc.

NITRO-GLYCERINE, an explosive substance appearing as a colorless or yellowish oily liquid, heavier than and insoluble in water, but dissolved by alcohol, ether, etc. It may be prepared by add-

ing to 350 parts by weight of glycerine 2800 parts by weight of a cooled mixture of 3 parts of sulphuric acid of 1.845 specific gravity and 1 part of fuming nitric acid. The liquid is poured into ten or twenty times its bulk of cold water, when the heavy nitro-glycerine sinks to the bottom. When violently struck nitro-glycerine explodes, being resolved into water, carbonic acid, nitrogen oxides, and nitrogen. The volume of gas produced is about 10,000 times the initial volume of the nitro-glycerine. Explosion can also be effected by heating to about 500° F. one portion of a mass, whereby partial decomposition is set agoing which almost immediately propagates itself throughout the liquid. The explosive force of nitro-glycerine compared with that of an equal volume of gunpowder is as 13:1. If any traces of acid be allowed to remain in nitro-glycerine it is liable to undergo spontaneous explosion; hence it is an exceedingly dangerous article to transport or store under such conditions. It is advisable to prepare the substance on the spot where it is to be used, and only in such quantities as may be required for immediate consumption. This method is adopted in many quarries and engineering undertakings, especially in America. Nitro-glycerine has for some time been used in the form of dynamite, to produce which it is mixed with some light absorbent substance. See Dynamite.

NOAH, one of the patriarchs of the Old Testament, son of Lamech, is described in the book of Genesis as being chosen by God for his piety to be the father of the new race of men which should people the earth after the deluge. Having been warned by God of the coming flood, he built a vessel (the ark) by his direction, and entered it with his family and all kinds of animals. (See Deluge.) After the waters had subsided the ark rested on Mount Ararat, where Noah offered a thank-offering to God, and was assured that the earth should never again be destroyed by a flood, as sign whereof God set the rainbow in the clouds. Noah died at the age of 950 years, 350 years after the flood. While modern accounts place Mount Ararat in Armenia, older traditions locate it in the mountains of the Kurds, east of the Tigris.

NIXON, Lewis, an American naval architect, born in Leesburg, Va., in 1861. He was superintending constructor of the navy at Cramp's shipyard and assistant constructor at the Brooklyn Navy Yard, and in 1890 designed the battleships of the Indiana class. In 1898 he was appointed president of the New York East River Bridge Commission. In 1901 he was named head of Tammany Hall, but resigned the post in May of the next year after five months service. He became president of the United States Shipbuilding Company of New York City in 1902.

NOCTURNE (nok-térn'), in painting, a night-piece; a painting exhibiting some of the characteristic effects of night light. In music, a composition in which the emotions, particularly those of love and tenderness, are developed. The nocturne has become a

favorite style of composition with modern pianoforte composers.

NODE, in astronomy, one of the points in which two great circles of the celestial sphere, such as the ecliptic and equator, the orbits of the planets and the ecliptic, intersect each other; and also one of the points in which the orbit of a satellite intersects the plane of the orbit of its primary. The node at which a heavenly body passes or appears to pass to the north of the plane of the orbit or great circle with which its own orbit or apparent orbit is compared is called the ascending node; that where it descends to the south is called the descending node. At the vernal equinox the sun is in its ascending node, at the autumnal equinox in its descending node. The straight line joining the nodes is called the line of the nodes. The lunar nodes are the points at which the orbit of the moon cuts the ecliptic.

NODE, in physics, a point in a vibrating body, or system of vibrating particles, where there is no movement. When a body is vibrating the vibratory motion is conveyed from one place to another by the action of the molecular forces of the particles on one another. Now when all the forces acting on a certain particle are at any instant in equilibrium, and the particle consequently remains at rest, there is said to be a node at the particle. If a plate of glass or metal be held in the hand, and a bow be drawn across the edge, particles of fine sand, previously placed on the plate, will arrange themselves in line, along which it is evident no vibration has taken place. These lines, called nodal lines, generally form geometrical figures.

NON-COMMISSIONED OFFICER, a soldier with the rank intermediate between that of the private and the commissioned officer. The following classification are the various non-commissioned grades of the United States army: (1) Sergeant-major, regimental, and sergeant-major, senior grade, artillery corps; (2) quartermaster-sergeant, regimental; (3) commissary-sergeant, regimental; (4) ordnance sergeant, post-commissary-sergeant, post-quarter-master-sergeant, electrician sergeant, hospital steward, first-class sergeant signal corps, chief musician, chief trumpeter, and principal musician; (5) squadron and battalion sergeant-major, and sergeant-major, junior grade, artillery corps; (6) first sergeant and drum-major; (7) sergeant and acting hospital steward; (8) corporal. In each grade, date of appointment determines the order of precedence.

NOME (nôm), the largest city of Alaska, in the Northern District; situated at the mouth of the Snake river, 13 miles west of Cape Nome, on the north shore of Norton Sound, Bering Sea. It is the center of the productive Cape Nome gold-mining district, which extends west along the coast for about 20 miles from Cape Nome. Pop. 15,320.

NOLLE PROSEQUI (nol'le pros'e-kwi), in law, a stoppage of proceedings by a plaintiff, an acknowledgment that he has not cause of action.

NOMADS, tribes without fixed habitations, generally engaged in the tend-

ing and raising of cattle, and changing their abode as necessity requires or inclination prompts. North Africa, the interior of North and South America, and the northern and middle parts of Asia, are still inhabited by nomadic tribes, some of whom are little better than bands of robbers.

NOMINATIVE CASE, in grammar, that form of a noun or pronoun which is used when the noun or pronoun is the subject of a sentence.

NON COMPOS MENTIS ("not of sound mind"), an expression used of a person who is not of sound understanding, and therefore not legally responsible for his acts.

NONSUIT, a term in law. When a person has commenced an action, and at the trial fails in his evidence to support it, or has brought a wrong action, he is nonsuited. A nonsuited plaintiff may afterward bring another action for the same cause, which he cannot do after a verdict against him.

NORD, a department in the north-east of France, bordering with Belgium; area, 2170 sq. miles. The principal minerals are coal and iron, which are extensively wrought; and the occupations connected with or depending on them render this department among the most important in France. The capital is Lille. Pop. 1,670,184.

NORDENSKIÖLD (nor'den-sheuld), Nils Adolf Erik, Baron, a Swedish naturalist and explorer, born at Helsingfors Nov. 18, 1832. He devoted himself to science, and was appointed to some important posts, but becoming obnoxious to the Russian authorities he settled in Sweden. Aided by the King



Baron Nordenskiöld.

of Sweden and others, Nordenskiöld was enabled, July 1878, to sail in the Vega, which was the first vessel to double the most northern point of the Old World, Cape Tchelyuskin, and after passing through Bering's Straits, reached Japan Sept. 2, 1879. On his return Nordenskiöld was enthusiastically welcomed in Europe, and created a baron by the King of Sweden. He died in 1901.

NOR'DICA, Lillian, an American soprano, born in 1859 at Farmington, Maine. She accompanied Gilmore's band to Europe in 1878, and later took up the study of opera with San Giovanni. After touring Germany and Russia, she appeared in 1881 in Paris, where her success was absolute. In 1887 she appeared in London, and in 1895 made

her first appearance in opera in her native land, at the Metropolitan Opera House, New York. She achieved her greatest successes in Aida, Les Huguenots, and the soprano parts in the Wagnerian operas.

NORFOLK (nor'fok), a county of England. Area, 1,356,173 acres, of which 1,095,195 acres are arable, meadow, and pasture. The county town is Norwich; the chief seaport is Yarmouth. Pop. 460,040.

NORFOLK, a city and port in the county of the same name, Virginia, on the river Elizabeth, 32 miles from the ocean. The harbor is safe and commodious, and a large trade is done in cotton. Norfolk and Portsmouth on the opposite site of the river constitute the largest naval station in the United States. Pop. 50,210.

NORFOLK-CRAG, in geology, an English tertiary formation belonging to the older Pliocene, resting on the chalk and London-clay. It consists of irregular beds of ferruginous sand-clay, mixed with marine shells and mastodon and elephant remains.

NORMAL SCHOOLS, called also Training Colleges, schools in which teachers are instructed in the principles of their profession and trained in the practice of it. The name is derived from the French *écoles normales*, established at the close of 18th century. These schools are now numerous in all countries that have a well-organized system of education. They may be either for teachers in elementary schools or for those of the secondary schools, and may be for males or females only or for both combined.

NORMAN ARCHITECTURE, the round-arched style of architecture, a variety of the Romanesque, introduced at the Norman Conquest from France into Britain, where it prevailed till the end of the 12th century. In its earlier stages it is plain and massive with but few mouldings, and those principally confined to small features; as the style advanced greater lightness and enrichment were introduced, and some of the later examples are highly enriched. The chevron, billet, nail-head, and lozenge mouldings are distinctively characteristic of this style. The more specific characteristics of churches in this style are: cruciform plan with apse and apsidal chapels, the tower rising from the intersection of nave and transept; semi-cylindrical vaulting; the doorways, deeply recessed, with highly decorated mouldings; the windows small, round-headed, placed high in the wall, and opening with a wide splay inside; piers massive, generally cylindrical or octagonal, and sometimes enriched with shafts; capitals cushion-shaped, sometimes plain, more frequently enriched; buttresses broad, with but small projection; walls frequently decorated by bands of arcades with single or interlacing arches. It course of time the arches began to assume the pointed character; the piers, walls, etc., to be less massive; short pyramidal spires crown the towers; and altogether the style assumes a more delicate and refined character, passing gradually into the Early English. Besides ecclesiastical

buildings, the Normans reared many castellated structures, the best remaining specimen of which is the Keep of the Tower of London. The Norman architects were not distinguished for science in construction. The walls of their buildings were of great thickness, and the piers supporting their arches were



Norman architecture.—Abbaye aux Dames, Caen.

usually of immense girth, yet notwithstanding this massiveness their works frequently gave way. The Abbaye aux Hommes and the Abbaye aux Dames at Caen, Normandy, afford excellent examples of this style; as also parts of the cathedrals of Durham, Peterborough, Norwich, and Canterbury, as well as many smaller churches.

NORMAN CONQUEST, in English history, the successful attempt made by William of Normandy in 1066 to secure the English crown from his rival Harold, son of Earl Godwin. It was no real conquest of the land and people by an alien race, but rather resembled in its chief characteristics the accession of William of Orange to the throne in 1688.

NORMANDY, an ancient province in the north of France, now divided into the department of Siene-Inférieure, Eure, Orne, Calvados, and Manche. On the decline of the Roman Empire it was seized by the Franks, and afterward in the 10th century, wrested from them by the Normans or Northmen, from whom it received its name. (See North men.) Charles the Simple gave his sanction to the conquest made by the Normans, and Rollo, their chief, received the title of Duke of Normandy. William the Bastard, sixth in succession from Rollo, having become king of England in 1066, Normandy became annexed thereto. On the death of William it was separated from England and ruled by his son Robert, and was afterward ruled by the kings of England until Philip Augustus wrested it from John and united it to France in 1203. Although several times invaded by the English, it was finally recovered

by the French in 1450. Normandy is one of the richest and most fertile parts of France.

NORMANS, the descendants of the Northmen who established themselves in Northern France, hence called Normandy. Besides the important place occupied in history by the Normans in Normandy and England, bands of Normans established themselves in S. Italy and Sicily, and Norman princes ruled there from the middle of the 11th till the end of the 12th century. See Normandy and Northmen.

NORRISTOWN, a city in Pennsylvania, on the Schuylkill, 16 miles n.w. of Philadelphia. It has extensive woolen and cotton factories, rolling-mills, foundries, etc. Pop. 26,172.

NORSE, the language of Scandinavia. Old Norse is represented by the classical Icelandic, and still with wonderful purity by modern Icelandic. The literature includes the early literature of the people of Norway, Sweden, and Iceland.

NORTE (nor'tā), Rio Grande del, a river of North America, forming for a long distance the boundary between Mexico and the United States, and falling into the Gulf of Mexico. It is shallow and of little use for navigation. Length about 2000 miles.

NORTH, one of the cardinal points, being that point of the horizon or of the heavens which is exactly in the direction of the North Pole. See Pole.

NORTH, Christopher. See Wilson, John.

NORTH, Frederick, Lord, Earl of Guildford, the eldest son of Francis, second earl of Guildford, born in 1732, died 1792. He belongs to English history as chief of the administration during the American war of Independence. In 1770 he succeeded the Duke of Grafton as minister, when his retention of the tea-duty, imposed upon the American colonists, led to the rising in America, and to the declaration of independence, 4th July, 1776. Lord North resigned on the 20th of March, 1782. He became Earl of Guildford by the death of his father in 1790.

NORTH ADAMS, a town in Berkshire co., Massachusetts, on the Hoosac river, near the west end of the great Hoosac Tunnel; has manufactures of cotton and woolen-goods, boots, shoes, paper, and nitro-glycerine. Pop. 26,710.

NORTH AMERICA, the northern half of the western continent, or New World. Under America a general description of North America has been given, more especially as compared and contrasted with South America, but some additional information may here be given.

The mainland of North America, in the widest sense of the name, is united to South America by the Isthmus of Panama, and extends from lat. 7° n. to lat. 72° n. In a narrower sense, and excluding the southern portion often spoken of as Central America, it extends only from lat. 15° n. To it on the north belongs an extensive archipelago of arctic islands, to the northeast of which lies Greenland, the latter generally regarded as belonging to America. The figure of North America is very irregular, and in that respect it resembles Europe. On the north is the





NORTH AMERICA

English Miles
100 200 300 400 500 600 700 800 900 1000

Longitude West 100 110 120 130 140 150 160 170 180
of Greenwich

great indentation of Hudson Bay, almost an inland sea, connected with the Atlantic by Hudson Strait. On the east are the Gulf of St. Lawrence, with the island of Newfoundland and the peninsula of Nova Scotia at its entrance; and the Gulf of Mexico, having on one side of its entrance the peninsula of Florida, on the other that of Yucatan. From the entrance of the gulf stretch eastward Cuba and others of the West India Islands. The chief features of the Pacific coast are the Gulf of California and peninsula of Lower California—further north Vancouver Island and the chain of other islands lining the coast. The continent terminates in a peninsular extension forming Alaska territory separated from Asia by Bering's Sea and Strait, the latter about 50 miles wide. The area of North America (excluding Greenland but including the West Indies) is about 8,150,000 sq. miles, or considerably more than double that of Europe. As regards its surface and physical features generally it presents various points of similarity with Europe—numerous large rivers, elevated mountain chains, and large plains suited for the growth of cereals and other crops; but most of its physical peculiarities are on a scale of greater magnitude than those of Europe. Thus its greatest mountain system, that of the Cordilleras (of which the Rocky Mountains strictly speaking form only a part), extends along the entire western side of the continent for a distance of at least 5000 miles, and rises to the height of 19,500 feet; the great plains which stretch on the east of these mountains from the Arctic Ocean to the Gulf of Mexico are also of far greater magnitude than those of Europe, contain the largest bodies of fresh water in the world, and are intersected by a series of rivers, one of which, the Mississippi-Missouri, is the longest of all rivers (length 4200 miles). The basin of the Mississippi-Missouri is bounded on the east by the Appalachian chain, one of much less comparative magnitude, but forming an important feature of the surface conformation of the continent. In its great navigable rivers and lakes North America possesses an immense system of inland navigation. As the great water-shed of North America is formed by the Rocky Mountains, all the chief rivers, with the exception of the St. Lawrence, have their sources on its slopes or plateaus, whence they flow to the Gulf of Mexico, the Pacific, the Arctic Ocean, or Hudson Bay. At more than one point in the system the water-parting is formed by a lake or marsh sending a stream on one side to the Pacific and on the other side to the Atlantic. The Nelson, Mackenzie, and Yukon are the chief rivers which flow into the Arctic Ocean, the last named having only recently been recognized as one of the great rivers of the world. The St. Lawrence is the largest of those which flow directly to the Atlantic. The lakes drained by the St. Lawrence, namely, Superior, Michigan, Huron, Erie, and Ontario, together cover an area of 97,000 sq. miles (or more than that of Great Britain). The largest, Lake Superior, has an area equal to that of Ireland. Other large lakes

further to the north include Winnipeg, Athabasca, Great Bear Lake, and Great Slave Lake. The principal islands on the east are Newfoundland, Anticosti, Prince Edward's Island, and Cape Breton, all at the mouth of the St. Lawrence; the Bahama Islands, Cuba, Hayti, Porto Rico, and Jamaica. On the northwest coast the principal islands are Vancouver's Island, Queen Charlotte's Island, and King George III.'s Archipelago. The only others of any importance are the Aleutian Islands, stretching west from the peninsula of Alaska; the islands in the Arctic Ocean are almost inaccessible.

The climate admits of a vast variety of vegetable products being grown, and though in the far north extremely rigorous, as a whole it is healthy and well suited to the peoples of Teutonic origin who now form so large a portion of the inhabitants. As regards minerals and other products North America is exceptionally favored, possessing abundance of all those that are most valuable—gold, silver, copper, iron, lead, and coal. Immense quantities of gold and silver have been produced. The coal fields are of prodigious extent, the Appalachian stretching without interruption 720 miles. The Pittsburg seam is 225 miles in length and 100 in breadth. Iron is worked in many parts, as are also copper and lead. Salt and petroleum are abundant. The forests are of vast extent, and include a great variety of the most useful timber trees, as pines, oak, ash, hickory, beech, birch, poplar, sycamore, chestnut, walnut, maple, cedar, etc. Maize or indian-corn is the only important farinaceous plant peculiar to the New World, but almost all fruits and grains known to Europe are cultivated to perfection in North America, to which Europe is now indebted for immense quantities of agricultural and dairy produce, as well as provisions of various kinds, and raw materials such as cotton, etc.

The political divisions of North America are the United States, the Dominion of Canada, Newfoundland, Mexico, and the Central American States. Canada occupies almost the whole of the continent north of the great lakes and lat. 49° n. The territory of the United States extends from the the British possessions to Mexico and the Gulf of Mexico, and from the Atlantic to the Pacific Ocean. Alaska territory belonging to the United States, occupies the northwest corner of the continent. The republican form of government prevails everywhere except in the British dominions. The areas and population are as follows:

	Area, sq. miles.	Pop.
British North America...	3,816,145	5,522,500
United States (including Alaska).....	3,507,640	88,912,058
Mexico.....	767,005	15,000,000
Central America (includ- ing British Honduras)...	181,527	3,550,100
West Indies.....	81,816	6,366,405
	8,354,133	119,351,063

The population now consists most largely of people of British or at least Teutonic origin, though the French and Spanish elements are also well represented. In the United States people of negro race number nearly 9,000,000.

The aboriginal tribes of North America, known as Red Indians, are of a hardy and warlike character, but they are gradually dying out before the march of the white man. They have all so strong a resemblance to each other in physical formation and in intellectual character as to leave no doubt of their belonging to one family. (See Indians, American.) In Mexico, a people, perhaps of same race, the Aztecs, had made considerable progress in civilization before the arrival of the Europeans. In the extreme north we find the Esquimaux, who differ considerably from the Indians, but are often classed along with them as people of Mongoloid origin.

America is now believed to have been visited by Norsemen in the 10th and 11th centuries; but the modern discovery is due to Columbus, who reached one of the West Indies in 1492. Following his lead the first to reach the mainland was John Cabot, who, with his son Sebastian, sailed from Bristol in 1497, and on June 24 came in sight of Labrador. In 1512 Sebastian Cabot sailed again for America; but a mutiny on board his vessels compelled him to return before more had been accomplished than a visit to Hudson's Bay. In the same year Florida was discovered by Ponce de Leon. Giovanni Verazzano, a Florentine sent out by Francis I. of France in 1524, surveyed upward of 2000 miles of coast, and discovered that portion now known as North Carolina. Ten years afterward, Jacques Cartier, a seaman of St. Malo, sailed from that port for Newfoundland, the north coast of which he surveyed and minutely described. He subsequently made several voyages, and was the first European to enter the St. Lawrence, ascending it as high as Montreal. The Spaniards had previously conquered Mexico, and a desire to extend their dominion (1519-21) in a northerly direction led to further discoveries in North America. The coast of California was discovered by Ximenes, and in 1539 the Gulf of California was first entered by Francisco de Ulloa. In 1578 Drake visited the northwest coast. These discoveries were followed by those of Davis in 1585-87, Hudson in 1610, Bylot and Baffin in 1615-16, all in the northeastern seas. By this time settlements had been made by the French, English, and Dutch. The French occupied Nova Scotia and Canada, and latterly Louisiana. Captain Behring, who was sent out in 1725 by the Empress Catharine, set at rest the disputed point whether Asia and America were separate continents. Other names associated with American maritime discovery are Cook, Meares, Vancouver, Kotzebue, and, more recently, Ross, Parry, Franklin, Beechey, and M'Clintock; inland travelers and discoverers include Hearne, M'Kenzie, Back, Rae, Simpson, Schwatka, etc. (See also North Polar Expeditions.) The Canadian authorities have in recent years done much in the way of survey and exploring the less-known portions of the Dominion, and Alaska is being made known by the efforts of expeditions from the United States. For general history see Canada, United States, Mexico, etc.

NORTHAMP'TON, a parl., county, and municipal borough of England, capital of the county of same name. Pop. 87,021.—The county is bounded by Lincoln, Rutland, Leicester, Warwick, Oxford, Bucks, Bedford, Huntingdon, and Cambridge; area, 629,912 acres, of which 560,000 acres are under crops. Pop. 338,064.

NORTHAMPTON, a town in Hampshire co., Massachusetts, situated on the right bank of the Connecticut, 93 miles west of Boston, has woolen, cotton, and silk factories, paper-mills, etc. Pop. 21,525.

NORTH BORNEO, the territory occupying the northern part of the island of Borneo under the jurisdiction of the British North Borneo Company, having been ceded by the Sultans of Sulu and Brunei in 1877-78 and the company having received a royal charter in 1881. The territory embraces 31,000 sq. miles, and has a pop. of 150,000. The exports comprise wax, edible birds'-nests, cocoa-nuts, gutta-percha, sago, tobacco, rattans, india-rubber, and timber. With a good climate and a fertile soil there is believed to be a great future before North Boreno. Along with Brunei and Sarawak the territory was made a British protectorate in 1888.

NORTH CAROLINA, one of the original states of the Union, is bounded on the n. by Virginia, on the n.w. by Tennessee, on the s. by Georgia and South Carolina, and on the e. by the Atlantic Ocean. It stretches 500 miles east, and west across the entire breadth of the

the Little Tennessee and the French Broad river. The eastern slope of the Blue Ridge in this state is the watershed for nearly all the Atlantic rivers of both North and South Carolina, all of them having a general southeast course. In the northern half of the state the Roanoke, the Tar, and the Neuse enter Albemarle and Pamlico sounds through deep and wide estuaries. The southern portion is drained by the Cape Fear river, and the western part of the Piedmont plain by the Yadkin or Great Pedee and the Catawba, both of which flow into South Carolina.

North Carolina lies in the warmer part of the temperate zone. The climate becomes almost sub-tropical in the southeastern corner. The rainfall is abundant and very evenly distributed, both in regard to seasons and localities, though the central region receives somewhat less rain than the coast and mountain regions, and the summer somewhat more than the other seasons. North Carolina is unrivaled by any state east of the Mississippi in the variety of its plant life. The bald cypress, white cedar, live oak, long leaf pine, and hickories are indigenous as well as blueberries, sumacs, alders, wild grapes, and palmettos.

Mining has long given occupation to a portion of the population. Gold was first discovered in 1819, and between that date and 1850, hundreds of gold and copper mines were opened in the middle and western sections. In the last few years mining industries have received a new impulse. Iron ores are mined on a considerable scale for export, many new gold and copper mines have been opened, and the amount of the various mining industries is increasing very notably. Mica mining began several years ago in the mountain region, and has grown to considerable importance, much the larger part of this material found in commerce being produced here. Fishing is the most important industry in the eastern part of the state. Shad and oysters are by far the most prominent. Of the many other varieties the more important are squeteague, alewife, mullet, striped bass, clams, and bluefish. Agriculture is the leading industry. Yet the largest part of the swampy coast land is unclaimed, and there is also much waste land in the mountainous area of the west. The crops which stand out prominently as to acreage is corn, the acreage for 1900 exceeding 47 per cent. of the total crop area, and the receipts equaling 25.2 per cent of the total crop receipts. Corn, wheat, oats, rye, cotton, and tobacco are the principal crops. The state ranks about eighth as a cotton state. The state holds third rank in the production of peanuts and second in the production of sweet potatoes. Watermelons, cabbages, and other vegetables, and strawberries and other small fruits are grown in abundance. Orchard fruits are most common in the western part of the state, the apple being the principal variety. Peaches are raised, but not in such great quantities as in other southern states. Rice is raised along the tide-water rivers, where the construction of dikes makes possible a system of flood-

ing and draining. Some horses, mules and asses are raised. The manufactures include cotton goods, cotton-seed oil and cake, tobacco, flouring and grist mill products, leather and lumber and timber products. Education is not in an advanced stage. Only a small part of the school age population is provided with schools. The chief institution for higher education is the University of North Carolina at Chapel Hill. North Carolina was first visited by the English in 1584 under a charter granted by Queen Elizabeth.

The First Provincial congress met in defiance of Governor Josiah Martin in 1774, and sent delegates to the continental congress. The colony was the first to authorize her delegates in congress to vote for independence, on April 12, 1776, and a state constitution was adopted on December 18, 1776. North Carolina troops took part in many of the important battles of the war, and in 1780-81 the state was invaded by the British. In 1791 the capital was located at Raleigh. In 1795 the State University was opened for students. The state opposed secession, but with President Lincoln's demand for troops to coerce the seceding states sentiment changed. An ordinance of secession was passed May 20th. North Carolina furnished more than 120,000 soldiers to the confederate cause, nearly twice her proportion. With the beginning of reconstruction in 1867 the civil authority was superseded by the military. Another convention was called in 1868, and a constitution allowing negro suffrage was adopted. In this year the Ku-Klux-Klan appeared, and Alamance and Granville counties were placed under martial law. The conservative democrats secured the legislature in 1870. The present constitution was adopted in 1876, and in 1900 a clause intended to restrict negro suffrage was added. The state has been democratic in national elections since the beginning of parties, with the exception of the years 1840-48, when it voted for the whig candidates, and 1868-72, when its vote was cast for Grant. Population, 2,100,000.

NORTH CAROLINA, University of, a state institution at Chapel Hill, N. C., chartered in 1789 and opened in 1795. It comprises a college and school of law, medicine, pharmacy, together with a summer school for teachers. It confers the bachelors degree in arts, science, philosophy, and law, the degree of graduate in pharmacy, the master's degree in philosophy, and medicine. Free instruction is offered to graduates of colleges and universities, to candidates for the ministry, to teachers and young men who are preparing to teach and to those who are laboring under bodily infirmities.

NORTH DAKOTA, one of the north central states of the Union, is bounded on the n. by Canada, on the e. by Minnesota, on the s. by South Dakota, and on the west by Montana. Its extreme breadth from north to south is a little over 210 miles; extreme length from east to west 360 miles; area, 74,312 sq. miles. It ranks fourteenth in size among the states of the Union. The state is



Seal of North Carolina.

Atlantic slope of the Appalachians in a long, narrow, rudely triangular belt, its western extremity, less than 20 miles wide, resting on the highest plateau and summits of that continental system of mountains, while its eastern end spreads out to a breadth of 200 miles, in a low, level and gently undulating plane on the Atlantic coast, with a curving shore line of more than 300 miles. Its area is 52,286 sq. miles, of which 3620 are covered with water. The highest mountains in the United States east of the Mississippi are in North Carolina, Mitchell's Peak, which is 6707 feet, being the highest point. The greater part of the state belongs to the Atlantic slope, but the western mountain region beyond the Blue Ridge belongs to the Mississippi basin, being drained by the headstreams of the Tennessee river, chief among which are

almost entirely an undulating prairie, with no prominences of note. It is divided naturally into the Red river and James river valleys, the Devil's lake, and Turtle mountain regions, and the Mouse river, Missouri slope, and the North Dakota counties. The geological features of the state are full of variety and interest. A very large proportion of the surface is covered by glacial and alluvial drift, and much of the country bears evidence of having been more than once submerged.

North Dakota has a typical continental climate characterized by enormous extremes of temperature. The average annual rainfall of 17.29 inches would scarcely suffice for the needs of agriculture were it not for the fact that fully three-fourths of the precipitation falls during the growing season (April

coal, the measures of which extend beneath the whole country west of the Missouri river. In many places the croppings are so exposed that the settlers mine their own fuel. In the Red river region, salt, limestone, and hydraulic lime are abundant.

North Dakota has a uniform public school system which extends from the primary grade to and including the normal and collegiate course. Besides the common schools, all the towns have graded and high schools. The state has a university located at Grand Forks, and there are colleges at Tower City, Fargo, Jamestown, Grand Forks, and Bismark. There is a deaf and dumb asylum at Devil's Lake, a state reform school at Mandan, a state hospital for the insane, and a home for the feeble-minded at Jamestown, a soldiers' home at Lisbon, a blind asylum in Pembina co., an industrial school and school for manual training at Ellendale, and school of forestry.

The population is about 600,000. Canadians and Swedes are the chief foreign nationalities represented. At the head of the educational establishments of the state are the University of North Dakota, Fargo college, Red River Valley university, and the Agricultural college at Fargo. The two chief towns are Fargo and Grand Forks. The territory of Dakota was named after a family of Indians, and was obtained by the United States through the Louisiana Purchase in 1803. The first real and permanent white settlement in this territory was probably established by French-Canadian settlers near Pembina in 1807. In 1812 Lord Selkirk, by mistake, built his fort south of the Canadian line. There were fur-trading posts established as early as 1808. Lewis and Clark in their expedition of 1804-06 spent the first winter near Mandan. Frémont in 1839 explored much of the country and Lieutenant Warner in 1855 made a report on the region for the government. The part east of the Missouri river was first attached to the territory of Minnesota in 1849. The part west, together with much of Idaho, Wyoming, and Montana, became part of Nebraska territory in 1854. On March 2, 1861, the territory of Dakota was organized. The territory was divided into two (see South Dakota) on February 22, 1889, congress authorized the calling of conventions to form constitutions. On November 2d President Harrison declared the state admitted. Politically the state has been republican from its admission, with the exception of one election (1892), when a fusion of the Farmers' Alliance with the democrats gave them control.

NORTH DAKOTA, University of, a coeducational state institution at Grand Forks, N. D., established in 1883. By the enabling act of congress under which the state was admitted, the university received a grant of 86,080 acres of land, and the School of Mines, a grant of 40,000 acres. The university comprises a college of arts, a normal college, and departments of law, mining engineering, mechanical and electrical engineering, military science, and pharmacy, together with a preparatory department.

NORTHEAST PASSAGE. See Polar Research.

NORTHEAST TERRITORY, a territory of Canada on the east of Hudson bay, and extending south to Quebec province. It forms part of the peninsula of Labrador, and is little known. It is intersected by Rupert's river, East Main river, Big river, Great and Little Whale river, etc., all flowing west to Hudson bay, and containing numerous lakes. Furs are the only commodity as yet obtained from it. See Canada.

NORTHERN-DRIFT, in geology, a name formerly given to boulder-clay of the Pleistocene period, when its materials were supposed to have been brought by polar currents from the north.

NORTHERN LIGHTS. See Aurora.

NORTHMEN, the inhabitants of ancient Scandinavia, or Norway, Sweden, and Denmark, who in England were also called Danes. They were fierce and warlike tribes, who as early as the 8th century made piratical expeditions to all parts of the European seas, these piratical robbers being known among themselves as vikings. In 795 the Scandinavians established themselves in the Farøe Isles and in Orkney; toward the middle of the 9th century they founded the governments of Novgorod and of Kiev, in Russia; and after the discovery of Iceland certain powerful Norwegian families, taking refuge from the persecutions of Harold, king of Denmark, settled in that island (in 870). In the 9th century they made repeated incursions into France, and it became necessary to purchase their retreat with gold. In that country latterly bands of them settled permanently and Charles the Simple was obliged (912) to cede to them the province afterward called Normandy, and to give his daughter in marriage to Rollo, their chief. Rollo embraced the Christian religion and became the first Duke of Normandy. The course of events was somewhat similar in England. Egbert, in the beginning of the 9th century, had no sooner made some approaches toward a regular government than the Danes made their appearance. Under Alfred (871-901) they overran great parts of England, but were finally defeated, and those of them who remained in the country had to acknowledge his sway. But they returned, under his successors, in greater force, obtained possession of the northern and eastern part of the country, and in the beginning of the 11th century three Scandinavian princes (Canute, Harold, and Hardicanute) ruled successively over England. The Saxon line was then restored; but in 1066 William, duke of Normandy, a descendant of Rollo, obtained the English throne, an event known as the Norman Conquest. According to the Saga narratives the Northmen were the first discoverers of America. The coasts of Spain, Italy, Greece, and Asia Minor were ravaged by them, and in Byzantium the body-guard of the emperors long consisted of Northmen known as Varangians, being recruited chiefly from those who had established themselves in Russia. See also Normandy, Normans.



Seal of North Dakota.

to September). Forest growth is found only along the river banks, and on the Turtle mountains in the north, and in some sections of the Red river valley. The remainder of the state is a treeless prairie covered with numerous species of grasses and other forage plants. The principal trees are cottonwood along the rivers, and oak, elm, birch, ash, and poplar in the Turtle mountains.

Wheat is the dominant crop. The Red river valley, which extends entirely across the eastern end of North Dakota, is perhaps the most famous wheat-producing region in the world. Oats is the next most important cereal. The cultivation of flax has increased from a few thousand acres to an acreage exceeding that of any other state. Barley is most extensively produced in the northeastern counties and corn in the southeastern. Potatoes yield abundantly and are an important crop. But very little fruit is raised. The prairie lands afford excellent pasturage, and large areas of wild salt and prairie grasses are annually cut for winter feed. Cattle and horses, mules, asses, sheep, and swine in the order named are the principal varieties of animals raised. Little manufacturing is carried on.

The eastern part of the state is well supplied with railroad facilities. The Great Northern crosses the northern part, and the Northern Pacific the southern part. In addition, the St. Paul, Minneapolis and Sault Ste. Marie enters the state at the southwest corner and extends in a northwest direction entirely across the commonwealth. The principal mineral resource of the state is brown

NORTH POLAR EXPEDITION. See Polar Explorations.

NORTH POLE. See Pole.

NORTH SEA, or GERMAN OCEAN, a large branch of the Atlantic ocean lying between Great Britain and the continent of Europe, having the former and the Orkney and Shetland islands on the west; Denmark and part of Norway on the east; Strait of Dover, part of France, Belgium, Holland, and Germany on the south; and the Northern ocean on the north. Extreme length, from the Strait of Dover to Unst, the most northern of the Shetland Isles, about 700 miles; greatest breadth, between Haddingtonshire, Scotland, and Denmark, about 420 miles; area, not less than 140,000 sq. miles. The North Sea is deepest on the Norwegian side, where the soundings give 190 fathoms; but its mean depth is no more than 31 fathoms. The bed of this sea is traversed by several enormous banks or eleva-



tions, of which the greatest is the Dogger bank. The shores of the sea are for the most part low, except in Scotland and Norway. They present numerous estuaries and other inlets, and are studded with numerous important towns, the sea being the highway for an immense maritime traffic. The fisheries, especially of herring, cod, ling, haddock, flat-fish, etc., are exceedingly valuable. The rise and fall of the tide is very great at certain places. The navigation, on account of sand-banks, winds, fogs, etc., is rather dangerous, but numerous light-houses help to render it safer. There are numerous islands along the coasts of Holland, North Germany, Denmark, and Norway.

NORTH SEA AND BALTIC CANAL, a great ship canal quite recently constructed at the cost of the German Empire, from Brunsbüttel at the mouth of the Elbe to the southernmost part of the Eider, and thence close along the course of that river, past Rendsburg, latterly following the same course as the old Eider canal to where it joins the Baltic at Holtenau, near Kiel. The waterway measures 197 feet wide at the surface and 72 feet at the bottom, with a depth of 29½ feet, and is intended for the passage of men-at-war as well as merchant ships, serving thus a double purpose. Its length is about 60 miles. The foundation-stone of the new works was laid by the Emperor William I. in June, 1887, and the last stone was laid by the Emperor William II. in June, 1895. The total cost of the construction was about 156,000,000 marks (\$39,000,000), toward which Prussia has contributed fifty million marks.

NORTH-STAR, the north polar star, the star α of the constellation Ursa Minor. It is close to the true pole, never sets, and is therefore of great importance to navigators in the northern hemisphere.

NORTH STAR, Order of, a Swedish order of knighthood, established in 1748 mainly as a recognition of important scientific services.

NORTHUMBERLAND, a northern maritime county of England, bounded south and southwest by the counties of Durham and Cumberland; east by the North sea, and north and northwest by Scotland. Area, 1,290,312 acres, of which about 717,000 acres are arable, meadow, and pasture. Coal-measures occupy an area of 180 sq. miles; and yield immense quantities of coal; lead, iron, limestone, and freestone are also wrought. The chief industries include ship-building and rope-making; forges foundries, iron, hardware, and machine works, chemical works, potteries, glass-works, etc. The coast abounds in cod, ling, haddock, soles, turbot, herrings, and a variety of other fishes. Northumberland is divided into four parliamentary divisions, Wansbeck, Tyneside, Hexham, and Berwick-upon-Tweed, each returning one member. Principal towns, Newcastle, Tynemouth, Shields, Morpeth, and Alnwick. Pop. 602,859.

NORTHWESTERN UNIVERSITY, a coeducational institution at Evanston, Ill., affiliated with the Methodist Episcopal Church. It was founded in 1851 and comprises a college of liberal arts, schools of law, medicine, pharmacy, dentistry, music and oratory. The college of liberal arts and the school of music are at Evanston, the professional schools in Chicago. The courses in the college lead to the bachelor's and master's degree in arts, philosophy, science, and letters, and to the degree of doctor of philosophy. The college course is largely elective after the second year, and provision is made for advanced credits by which the time required for subsequent professional studies may be shortened. The Garrett Biblical Institute, under Methodist Episcopal control, forms the theological department of the university.

NORTHWEST PASSAGE, a passage for ships from the Atlantic ocean into the Pacific by the northern coasts of the American continent, long sought for, and at last discovered in 1850-51 by Sir R. MacClure. See North Polar Expeditions.

NORTHWEST PROVINCES, a political division (lieutenant-governorship) of British India, bounded on the n. by Tibet, on the n.e. by Nepaul and Oudh, on the s. by the Chutia Nagpur district and the Central Provinces, and on the w. by Gwalior, Rajputana, and the Punjab; area 86,983 sq. miles. In 1902 the name was changed to United Provinces of Agra and Oudh. Pop. 47,691,782.

NORTHWEST TERRITORIES, that portion of northwestern Canada outside the provinces of Ontario, Quebec, Manitoba, British Columbia, Alberta and Saskatchewan, formerly the Hudson's Bay territory; -estimated area, 2,648,000 square miles. This region is governed by a lieutenant-

governor, assisted by an advisory council, there being also a legislative assembly elected by the people. Regina is the seat of government. The southern part of this vast territory has been divided into the districts of Assiniboia and Athabasca, and the provinces of Alberta and Saskatchewan, with the Yukon and Mackenzie districts farther north. The agricultural and other capabilities of at least a third of this region are very great, there being vast areas adapted for wheat, oats, barley, etc., or for stock-rearing; and land in the districts just mentioned is being rapidly taken up. Coal is abundant, and is now being worked; petroleum also is abundant; copper, silver, iron, salt, and gold have been found in various localities. Great quantities of furs are obtained, especially by the agents and employees of the Hudson Bay company to whom the whole territory formerly belonged, and who have many outlying forts and stations. There are many lakes and rivers, the former including Athabasca, Great Slave lake, Great Bear lake, etc.; and the latter the Saskatchewan, Athabasca, Peace, Mackenzie, etc., giving 10,000 miles of navigable rivers. (See also Canada.) The Canadian Pacific railway crosses the southern part of this magnificent territory, and towns and villages are rapidly being formed along its course. There are several other railways made or to be made, one running northwest from Regina to Battleford and Edmonton. Schools are being established in the more thickly-settled parts and education is free. In the Rocky mountain region five tracts of land have been reserved as national parks, on account of their interesting scenery. One of these, 260 sq. miles in area, presents a remarkable aggregate of lake, river, and mountain scenery, including the hot mineral springs of Banff, which are already being taken advantage of by persons suffering from various ailments. Pop. about 20,000.

NORWAY (Norwegian, Norge), a country in the north of Europe, bounded on the northeast by Russian Lapland, and east by Sweden, and washed on all other sides by the sea—by the Arctic ocean on the north, the Atlantic and the North Sea on the northwest and west, and the Skager-Rack on the south. It is about 1080 miles in length, and its greatest breadth is about 275 miles, but toward the north it narrows so much as to be in some places not more than 20 miles; area, 122,280 sq. miles, or rather more than the British Isles. The total population on Dec. 3, 1906, was returned at 2,231,088. The country is divided into twenty prefectures, of which the capital Christiania forms one, and the city of Bergen another. Other important towns are Trondhjem, Stavanger, and Drammen.

The coast consists chiefly of bold precipitous cliffs, and is remarkable both for the innumerable islands by which it is lined, and the bays or fiords which cut deeply into it in all directions. The surface is very mountainous, particularly in the west and north. Very commonly the mountain masses assume the form of great plateaux or table-lands,

called fjelds or fields, as the Dovre Fjeld, Hardanger Fjeld, etc. The highest summits belong to the Sogne Fjeld, a congeries of elevated masses, glaciers, and snow-fields in the center of the southern division of the kingdom, where rise Galdhøepig (8400 feet), the Glitretind (8384), and Skagastölstind (7879). Immense snow-fields and glaciers are a feature of Norwegian scenery. The few important rivers that Norway can claim as exclusively her own have a southerly direction, and discharge themselves into the Skager-Rack; of these the chief are the Glommen (400 miles), and its affluent the Lougen. The most important river in the north is the Tana, which forms part of the boundary between Russia and Norway, and falls into the Arctic ocean. Lofty waterfalls are numerous. Lakes are extremely numerous, but generally small. The principal is the Mjøsen Vand. The prevailing rocks of Norway are gneiss and mica-slate, of which all the loftier mountains are composed. The most important metals are iron, copper, silver, and cobalt, all of which are worked to a limited extent. The climate of Norway is on the whole severe. The harbors on the west, however, are never blocked up with ice; but in places more inland, though much farther south, as at Christiania, this regularly happens. The forests are estimated to cover about a fifth of the whole surface, and form a very important branch of national wealth. The principal forest tree is the pine. Only about 1000 sq. miles is under the plow. The chief cereal crop is oats. Barley ripens at 70° of latitude; rye is successfully cultivated up to 69°; oats to 68°; but wheat not beyond 64°, and that only in the most favorable seasons. Potatoes are grown with success even in the far north. The farms are generally the property of those who cultivate them, and commonly include a large stretch of mountain pasture, often 40 or 50 miles from the main farm, to which the cattle are sent for several months in summer. The rearing of cattle is an extensive and profitable branch of rural economy. The horses are vigorous and sure-footed, but of a diminutive size; the ponies are among the best of their kind, and are often exported. The reindeer forms the principal stock in the extreme north. Among the larger wild animals are the wolf, bear, elk, deer. The fisheries of Norway are of very great value; they include the cod, herring, mackerel, salmon, shark, walrus, seal, and lobster, the cod and herring fisheries being by far the most important. The rivers and lakes abound with salmon and salmon-trout, and make Norway one of the best angling countries in the world. Manufactures include cotton, woolen, flax, and silk tissues. Distilleries, brick-works, saw and flour-mills, are numerous; and there are foundries, machine-works, lucifer-match works, tobacco-factories, and sugar-refineries. The export trade includes fish, timber, wood-pulp, whale and seal oil, metals, skins, feathers, furs, lucifer-matches, etc. The exports in 1907 were \$44,274,000. The chief imports are grain, textile goods, wool, sugar, coffee, tobacco, wine,

brandy, petroleum, etc. Imports in 1899, \$86,246,000. The chief trade is with Britain and Germany; Sweden, Denmark, and Russia coming next. The Norwegians are famous as sailors, and in the tonnage of its mercantile navy, Norway is surpassed only by Britain and Germany in Europe. Bergen, Christiania, and Trondhjem are the chief ports. Railways are about 1200 miles. The monetary system is the same as that of Denmark.

Norway is a limited hereditary monarchy. The king is not allowed to nominate any but Norwegian subjects to offices under the crown. On a new succession the sovereign must be crowned King of Norway at Trondhjem. The members of the legislative assembly or Storting are elected every three years by voters who have themselves been elected by the citizens possessing a certain qualification. It subdivides itself into two chambers—one, the Lagthing, consisting of one-fourth of the members; the other, the Odelsting, has the remaining three-fourths. The chambers meet separately and each nominates its own president and secretary. Every bill must originate in the Odelsting. When carried in that body it is sent to the Lagthing, and thence to the king, whose assent makes it a law. The great body of the people are Protestants of the Lutheran confession, which is the state religion. Other sects are tolerated, although government offices are open only to members of the Established Church. Elementary education is free and compulsory. Besides primary schools there are numerous secondary schools. There is but one university, that of Christiania. The army is raised mainly by conscription. The nominal period of service is thirteen years, five in the line, four in the Landværn (liable to be called to defend the country), and four in the Landstorm (for local defense). The troops of the line number 30,000. The navy comprises four iron-clads besides other vessels. The people are almost entirely of Scandinavian origin. A small number of Lapps (called in Norway Finns) and Qvaens, reckoned at 20,000 in all, dwell in the northern parts. The Norwegian language is radically identical with the Icelandic and with the Danish. For centuries Danish was generally employed as the literary and educated language of the country, as it still is; but during last century a vernacular literature has sprung up, the chief names connected with which are Wergeland, Welhaven, Asbjørnsen, Bjørnson, Ibsen, etc.

In the earliest times Norway was divided among petty kings or chiefs (jarls), and its people were notorious for their piratical habits. (See Northmen.) Harold Fair-hair (who ruled from 863 to 933) succeeded in bringing the whole country under his sway, and was succeeded by his son Erick. He was ultimately driven from the throne, which was seized in 938 by his brother, Hako I., who had embraced Christianity in England. Magnus the Good, the son of St. Olaf and Alfild, an English lady of noble birth, was called to the throne in 1036; and having in 1042 succeeded also to the throne of Denmark united

both under one monarchy. (See Denmark.) After his death the crowns of Norway and Denmark again passed to different individuals. In 1319 the crowns of Norway and Sweden became for a short time united in the person of Magnus V. Erick of Pomerania succeeded, by separate titles, to Norway, Sweden, and Denmark; and in 1397 was crowned king of the three kingdoms. Sweden then for a time became a separate kingdom; but the union between Denmark and Norway was drawn closer and closer, and very much to the disadvantage of the latter, which was ultimately degraded into a mere dependency of the former. The subsequent history of Norway becomes for a long period merely a part of that of Denmark. After the defeat of Napoleon by the allies in 1813 it was arranged by the treaty of Vienna in 1814 that Denmark must cede Norway to Sweden, and the result was the union of the two countries under the Swedish crown. The union was accompanied with a certain amount of friction, partly owing to the entirely democratic character of the the constitution of Norway, in which country titles of nobility were abolished early in the 19th century, and was dissolved in 1905, and Haakon VII. was proclaimed king.

NORWICH (nor'ich), a municipal, parl., and county borough and bishop see in England, capital of the county of Norfolk, on the Wensum, where it joins the Yare, 98 miles n.n.e. of London. The cathedral, founded in 1094, was originally in the Norman style, but now exhibits also later styles. The castle, a noble feudal relic, reputed to have been built by Uffa about 1066, is finely situated on a lofty eminence, and still surmounted by its massive donjon tower in the Norman style. St. Andrew's Hall originally the nave of the Blackfriars' Church, the Guildhall, and the bishop's palace, also deserve mention. Manufactures, of which worsted and mixed goods are the staple, are extensive, including also mustard and starch, boot and shoe making, iron-working, brewing, etc. Pop. 111,728.

NORWICH, a city in Connecticut, on the Thames, 13 miles north of New London. The falls of the river afford extensive water-power, and there are considerable manufactures of cotton and woolen goods, paper, fire-arms, machinery, etc. Pop. 20,115.

NOSE, the organ in man and the higher animals exercising the olfactory sense, or that of smell, and concerned through its apertures or passages in the function of respiration and in the production of voice. The bones of the nose comprise the boundaries of the nasal fossæ or cavities, which open in front in the nasal apertures, and behind into the pharynx or back part of the mouth. The front nostrils, or openings of the nose, are in the skeleton of an oval or heart shape, while the openings of the posterior nostrils are of a quadrilateral form. The bones which enter into the entire structure of the nose number fourteen. In addition there are certain cartilaginous pieces which assist in forming the structure of the nose, lateral cartilages on either side, and a cartilaginous sep-

tum in the middle between the two nostrils. There is also a bony septum which unites with the cartilaginous septum to form the complete partition of the nose. Several special muscles give a certain mobility to the softer parts of the organ. The nostrils and nasal cavities are lined by the mucous membrane (pituitary membrane) richly furnished with arteries and veins and covered with a copious mucous secretion which keeps it in the moistened state favorable to the due exercise of the function of smell. The proper nerves of smell, the olfactory nerves, form the first pair of cerebral nerves or those which take origin from the cerebrum; while the nerves of common sensibility of the nose belong to the fifth pair of cerebral nerves. The olfactory nerves are distributed in the mucous membrane of either side in the form of a sort of thick brush of small nerve-fibres. The study of the comparative anatomy of the nasal organs shows us that man possesses a sense of smell greatly inferior in many instances to that of the lower animals. The distribution of the olfactory nerves in man is of a very limited nature when compared with what obtains in such animals as the dog, sheep, etc. All Vertebrates above fishes generally resemble man in the essential type of their olfactory apparatus. In most fishes the nostrils are simply shut or closed sacs, and do not communicate posteriorly with the mouth. The proboscis of the elephant exemplifies a singular elongation of the nose, in which the organ becomes modified for tactile purposes. In the seals and other diving animals the nostrils can be closed at will by sphincter muscles or valvular processes. The most frequent diseases or abnormal conditions which affect the nose comprise congenital defects, and tumors or polypi.

NOSOLOGY (from the Greek *nosos*, disease), in medicine, that science which treats of the systematic arrangement and classification of diseases, with names and definitions, according to the distinctive character of each class, order, genus, and species. Many systems of nosology have been proposed at different times, but that of Dr. William Farr has been very generally adopted as practically useful.

NOSTALGIA. See Home-sickness.

NOTARY, an officer authorized to attest contracts or writings, chiefly in mercantile matters, to make them authentic in a foreign country; to note the non-payment of foreign bills of exchange, etc. Often called a Notary Public.

NOTATION, Arithmetical, Algebraic Chemical, Musical. See Arithmetic, Algebra, Chemistry, Music.

NOTE, in music, a character which, by its place on the staff, represents a sound, and by its form determines the relative time or continuance of such sound. See Music.

NOT GUILTY is the general issue or plea of the accused in a criminal action. When a prisoner has pleaded not guilty he is deemed to have put himself forward for trial, and the court, may order a jury for the trial of such person accordingly. Should he refuse to plead,

the court may direct the proper officer to enter a plea of not guilty on his behalf. On an indictment for murder a man cannot plead that it was in his own defense, but must answer not guilty; the effect of which is, that it puts the prosecutor to the proof of every material fact alleged in the indictment, and it allows the prisoner to avail himself of any defensive circumstance as fully as if he had pleaded them in a specific form. In England and the United States a jury can only give a verdict either of guilty or not guilty, and the latter often really means that there is not sufficient evidence to convict.

NOTRE DAME (*nō-tr dām*), a title of the Virgin Mary, is the name of many churches in France, and particularly of the great cathedral at Paris, which was founded in the 12th century, and forms a prominent object in the city.

NOTTINGHAM, a town near the middle of England, capital of the county of same name, on the Leen, near its junction with the Trent, 110 miles northwest of London. The castle, which crowns the summit of a rock, rising 133 feet above the level of the Leen, was originally built by William the Conqueror as a means of overawing the outlaws frequenting the recesses of Sherwood Forest. The principal educational and literary institutions are the University college and Technical school, high-school for boys, the Blue-coat school, the school of art, the People's hall, and the Mechanic's institute. An arboretum covering 18 acres is a feature of the town. The staple manufactures are hosiery and lace, the latter being a sort of specialty. There are also manufactures of cotton, woolen, and silk goods, and of articles in malleable and cast iron. Pop. 239,753.—Nottinghamshire, or Notts, is an inland county, bounded north by York, east by Lincoln, south by Leicester, and west by Derby. Area, 526,176 acres, of which about 454,000 are arable, meadow, and pasture. Pop. 514,537.

NOUN (from the Latin *nomen*, name), in grammar, a word that denotes any object of which we speak, whether that object be animate or inanimate, material or immaterial. Nouns are called proper or meaningless when they are the names of individual persons or things, as George, Berlin, Orion; common, when they are the name of a class of things, as book, page, ball, idea, emotion; collective, when they are the names of aggregates, as fleet, army, flock, covey, herd; material, when they are the names of materials or substances, as gold, snow, water; abstract, when they are the names of qualities, as beauty, virtue, grace, energy. Some of the older grammarians included both the noun and the adjective under the term noun, distinguishing the former as noun-substantive and the latter as noun-adjective.

NOVA SCOTIA, a province of the Dominion of Canada, consisting of a peninsula or portion properly called Nova Scotia, and the Island of Cape Breton, which is separated from the mainland by the Strait or Gut of Canso. It is bounded on the north by Northumberland strait and the Gulf of St.

Lawrence; northeast, south, and southeast by the Atlantic; west by the Bay of Fundy; and north by New Brunswick, with which it is connected by an isthmus only 11 miles broad (traversed by a ship railway); area, 20,907 sq. miles, or over 13,000,000 acres. The wild animals include bear, foxes, moose, caribou, otter, mink, etc., and excellent sport may be had. The minerals are also valuable. Granite, trap, and clay slate rocks predominate. Coal, with iron in combination abounds in many places, and more than 1,500,000 tons is raised annually. Gold is also found, and is being worked. Copper ore exists, as also does silver, lead, and tin; and gypsum is plentiful. Petroleum has been recently discovered, and wells have been sunk in Cape Breton. Wheat, potatoes, and oats are important crops; and buckwheat, rye, barley, Indian corn, and field-pease are extensively cultivated. Great quantities of hay are made, and a good deal is exported. The apple-orchards of the western counties are very productive, and extend along the highway in an unbroken line for 30 miles. Apples are now largely exported. Cattle and sheep are raised in considerable numbers, and are exported both to New Brunswick and Newfoundland. There are extensive fisheries of cod, haddock, mackerel, herrings, etc. The manufactures are comparatively unimportant, but a good deal of capital is invested in saw-mills, flour-mills, ship-building, tanning, etc. The foreign trade is comparatively large, more shipping being owned in proportion to population than in any other country. The imports consist principally of British and American manufactures; spirits, sugar, wines, coffee, etc. The principal articles of export are fish, timber, and coal. Education is widely and equally diffused and is free to all classes. There are four degree-conferring colleges or universities. The public affairs of the colony are administered by a lieutenant-governor, council, and house of assembly. It sends ten members to the senate and twenty to the House of Commons of the Dominion parliament. The laws are dispensed by a supreme court and district courts as in Canada. Halifax, the capital, possesses one of the finest harbors in America. The province is well provided with railways. Pop. 459,116; of the capital, 40,787.

NOVEL, a prose narrative of fictitious events connected by a plot, and involving portraiture of character and descriptions of scenery. In its present signification the term novel seems to express a series of fictitious narrative somewhat different from a romance, yet it would be difficult to assign the exact distinction, though the former is generally applied to narratives of everyday life and manners; while the romance deals with what is ideal, marvelous, mysterious, or supernatural. Prose fiction written for entertainment is of considerable antiquity.

NOVEM'BER, formerly the ninth month of the year, but according to the Julian arrangement, in which the year begins on 1st January, November became the eleventh month, and comprised 30 days. See Calendar.

NOV'GOROD, a town of Russia, capital of the government of same town, on the Volkhov, near the point where it issues from Lake Ilmen, 103 miles s.s.e. St. Petersburg. It was during the middle ages the largest and most important town of Northern Europe. Novgorod was the cradle of the Russian monarchy, and a monument was erected in 1864 to commemorate the thousandth anniversary of the foundation of the Russian State by Rurik. The trade and manufactures are now unimportant. Pop. 20,599.—The government has an area of 47,236 sq. miles. The principal crops are rye, barley, oats, flax, and hemp. Pop. 1,194,078.

NOVICE, a candidate of either sex for a religious order; the novitiate being the time in which the novice makes trial of a monastic life before taking the final vows. The term of probation is at least one year, and may extend to two or three. The order is not bound to receive a novice at the end of his novitiate, neither can a novice be hindered to leave the order when the term of novitiate is expired. The age for commencing a monastic life is fixed by the Council of Trent at sixteen years.

NOVUM OR'GANUM, the second part of Bacon's great projected work the *Instauratio Magna*, published in 1620. It is written in Latin, and along with the *Advancement of Learning* forms the foundation of the inductive or Baconian system of philosophy.

NUBIA, a name given, in a more or less restricted sense, to the countries of N.E. Africa bounded n. by Egypt, e. by the Red Sea, s. by Abyssinia, Senaar, and Kordofan, and w. by the Libyan Desert. With the exception of the valley of the Nile the country is generally desert. The Nubians belong to the



Nubians.

Arabian and Ethiopian races, who converge in the Nile basin; they are a handsome race, of dark-brown complexion, bold, frank, cheerful, and more simple and incorrupt in manners than their neighbors either up or down the river. Their language is various dialects of the Negro speech of Kordofan. Pop. estimated at 1,000,000 or 1,500,000. Among the towns are Dongola, Khartoom, Berber, etc. See Egypt, Soudan.

NUDIBRANCHIATA, the section of "Naked-gilled" Molluscs. They have no shells in their adult state, and the gills are completely exposed, existing



Nudibranchiata.

for the most part as branched or arborescent structures on the back or sides of the body. The sea-lemons, sea-lugs, etc., are examples.

NUISANCE, a legal term used to denote whatever incommodes or annoys; anything that produces inconvenience or damage. Nuisances are of two kinds—public or common and private. Public nuisances are: annoyances in the highways, bridges, and public rivers; injurious and offensive trades and manufactures, which, when hurtful to individuals, are actionable, and when detrimental to public health or convenience, punishable by public prosecution, and subject to fine according to the nature of the offense. A private nuisance may be defined as an injury or annoyance to the person or property of an individual. Whatever obstructs passage along the public ways, or whatever is intolerably offensive to individuals in their homes, constitutes a nuisance. Causing inconvenience to one's neighbors may not in itself be a nuisance at law; there must be positive discomfort or danger. As regards the power for the removal of public and private nuisances, a statute was passed in 1855 for England, called the Nuisances Removal Act, which has been amended by subsequent acts. By these acts authority is given to some local board, local officers or overseers of the parish, to carry out the provisions of the act. The local authority is to appoint a sanitary inspector, who is empowered to remove or remedy nuisances, such as the carrying on of noisome trades or manufactures; may be empowered on reasonable complaint, to demand an entrance into any private premises so as to inspect their condition; and may order the removal of the nuisance. If the offender refuse to do so the local board may remove the nuisance at his expense, and sue him for such expenses. The Public Health Act of 1867 created a number of statutory nuisances. The law in the United States differs little from that of England.

NULLIFICATION ACTS is a term used with reference to certain acts adopted by the legislature of South Carolina in 1830-32, by which it was sought to nullify various acts of congress in relation to the tariff.

Andrew Jackson was president of the United States when the state of South Carolina undertook its nullification proceedings, and he made short work of them. After the South Carolina legislature had several times declared, each time in stronger language, what it would or could or might do if a tariff bill were passed, congress repealed the act of

1828, and adopted a new scale to take effect March 3, 1833. President Jackson had already declared in emphatic terms that he would see to the execution of the laws, and the state legislature had declared his statement to be an unauthorized interference with the affairs of South Carolina. Finally on November 24, 1832, a convention called by the legislature adopted an ordinance "to nullify certain acts of the congress of the United States, purporting to be laws laying duties and imposts on the importation of foreign commodities." It declared the tariff laws of 1828 and 1832 to be unconstitutional and void and the collections of duties unlawful, and finally declared that if any attempt should be made by the federal government to coerce the state, they would hold themselves absolved from all obligations to maintain their political connection with the Union and would organize a separate government. This document was sent out to other states as the declaration of South Carolina.

Jackson replied with a proclamation declaring the ordinance an act of nullification and secession, denying the right of any state to annul a law, and declaring his determination "to execute the laws, to preserve the Union by all constitutional means, to arrest, if possible, by moderate and firm measures, the necessity of a resort to force."

The South Carolina legislature protested, exhorted the people to ignore the president's proclamation, and, on December 20, 1832, passed an act to carry the ordinance into effect by providing judicial remedies in the state courts for the recovery of goods seized or held for dues under the act of congress. On March 2, 1833, congress amended the act of 1832 by a compromise act reducing certain duties, and followed it on the next day by a Force Act, empowering the president to use military force to secure the collection of duties. Twelve days later the convention came together again and repealed its ordinance of nullification, but three days later it adopted another ordinance declaring the Force Act null and void. But, as the original ordinance had been repealed and the duties were collected without trouble, General Jackson could afford to treat the last ebullition as mere brutum fulmen and did so, although he is credited with an expressed desire to hang John C. Calhoun, the leader of the nullification movement.

NUMA POMPILIUS, the second king of Rome, who is said to have reigned from 714 to 672 B.C. He was regarded as the founder of the most important religious institutions of the Romans, and left writings explanatory of his system, which were burnt by order of the senate when accidentally discovered 400 years after his time.

NUMBER, a single unit considered a part of a series, or two or more of such units. An abstract number is a unit or assemblage of units considered independently of any thing or things that they might otherwise be supposed to represent. For example, 5 is an abstract number while it remains independent; but if we say 5 feet or 5 miles it becomes a concrete number. Cardinal numbers

are numbers which answer the question, "How many?" as one, two, three, etc., in distinction, from first, second, third, etc., which are called ordinal numbers. A prime number is a number which can be divided exactly by no number except itself and unity. A number is even when it is divisible by two, otherwise it is odd. See Arithmetic.

NUMBER, in grammar, that distinctive form which a word assumes according as it is spoken of or expresses one individual or several individuals. The form which denotes one or an individual is the singular number; the form that is set apart for two individuals (as in Greek and Sanskrit) is the dual number; while that which refers indifferently to two or more individuals or units constitutes the plural number.

NUMBERING-MACHINE, a machine for impressing consecutive numbers on account-books, coupons, railway-tickets, bank-notes, etc. One of the principal forms of the apparatus consists of discs or wheels decimally numbered on their peripheries, the whole mounted on one axle, upon which they turn freely, acting upon each other in serial order. The first wheel of the series, containing the units, is moved one figure between each impact, and when the units are exhausted the tens come into action and act in coincidence with the units; so on of the hundreds, thousands, etc.

NUMBERS, Book of, the fourth of the books of the Pentateuch. It takes its name from the records which it contains of the two enumerations of the Israelites, the first given in chaps. i.-iv. and the second in chap. xxvi. It contains a narrative of the journeyings of the Israelites from the time of their leaving Sinai to their arrival at the plains of Moab, and portions of the Mosaic Law. Formerly the authorship was implicitly attributed to Moses, but some modern scholars resolve the book into various parts, to each of which is assigned a separate author. See Pentateuch.

NUMERAL, a figure or character used to express a number; as the Arabic numerals, 1, 2, 3, etc., or the Roman numerals, I, V, X, L, C, D, M, etc. See Arithmetic.

NUMERATION, the art of expressing in characters any number proposed in words, or of expressing in words any number proposed in characters. The chief terms used for this purpose are the names of the digits from one to ten, a hundred, a thousand, a million, etc. The term billion is of uncertain use: in Britain it is a million of millions; in France, America, etc., a thousand millions.

NUMID'IA, an ancient country of North Africa, corresponding roughly with modern Algeria. It was divided among various tribes, but after the second Punic war it was united under Massinissa, and several of its rulers became noted in Roman history. In B.C. 46 it became a Roman province.

NUMISMAT'ICS, or **NUMISMATOL'OGY**, the science of coins and medals, the study of which forms a valuable and important adjunct to that of history. The word coin is in modern times applied to those pieces of metal struck

for the purpose of circulation as money; while the word medal signifies pieces of metal similar to coins not intended for circulation as money, but struck and distributed in commemoration of some person or event. Ancient coins, however, are often termed medals. They are of gold, silver, bronze, electrum, or billon, and in ancient times served not only the purposes of a currency, but as chronicles of political events, and abstracts of the times. It is also from coins alone that we derive our knowledge of some of the most celebrated works of ancient art, particularly of ancient statuary. In ancient, as in modern times, while the coins of empires or kingdoms were (at least in later times) distinguished by the head of the reigning prince, those of free states were distinguished by some symbol. Thus, Egypt was distinguished by a sistrum, an ibis, a crocodile, or a hippopotamus; Arabia by a camel; Africa by an elephant; Athens by an owl; Syracuse and

religious devotion. Nearly all the masculine orders or rules had corresponding feminine institutions, while there were also numerous independent orders of nuns. At present the number of nuns is largely in excess of that of monks. The first nunnery is said to have been that founded by a sister of St. Anthony about A.D. 270; and the first in England was founded at Folkestone by Eadbald, king of Kent, in 630.

NUN'CIO, an ambassador of the first rank (not a cardinal) representing the pope at the court of a sovereign entitled to that distinction. A papal ambassador of the first rank, who is at the same time a cardinal, is called a legate. The title of internuncio is given to an ambassador of inferior rank, who represents the pope at minor courts. Formerly the papal nuncios exercised the supreme spiritual jurisdiction in their respective districts. But now, in those Catholic kingdoms and states which hold themselves independent of the court of Rome



Nuremberg—The Pegnitz and St. Lawrence church.

Corinth by a winged horse. There were also a number of symbols having a general signification. Thus, a patera signified a libation, and indicated the divine character of the person holding it in his hand; the shaft of a spear denoted sovereign power; an ensign on an altar, a new Roman colony; and so forth. Mediæval coins include the Byzantine, the coins of the various European states from the fall of Rome to the accession of Charlemagne; the Carolingian currency from Charlemagne to the fall of the Swabian house (1268); early Renaissance to 1450; and classical Renaissance from then till 1600. Modern coins are classed geographically and chronologically. Oriental coins are those of Ancient Persia, Arabia, Modern Persia, India, China, etc.

NUN, a word of unknown origin, but supposed to be connected with a Coptic word signifying "pure," applied in the Roman Catholic church to a female who retires from the world, joins a religious sisterhood, takes upon herself the vow of chastity and the other vows required by the discipline of her convent, and consecrates herself to a life of

in matters of discipline, the nuncio is simply an ambassador.

NUREMBERG (ny'rem-berg), a town in Bavaria, 93 miles n.n.w. of Munich. Within the walls it is one of the best-preserved specimens of a mediæval town in existence. The houses are generally lofty and picturesque, and many of them have three ranges of dormer-windows on their steep roofs. The town, which is very densely built, rises gradually to a height on the north side, on which the old castle is situated. The Pegnitz, traversing the town from east to west, divides it into two nearly equal parts—the north, and the south, which communicate by numerous bridges. It contains a large market-place and several interesting churches, among the finest of which are the Gothic churches of St. Lawrence and St. Sebaldus, both dating from the 13th century. Other places of worship are the 14th century Marienkirche (Roman Catholic), and the Jewish synagogue in oriental style (1867-74). The castle dates from the reign of Frederick Barbarossa (1158); part of the interior was fitted up in Gothic style (1854-56) as a royal

TEACHING THE ART OF RUNNING A NURSERY—MOTHERS INSTRUCTED IN THE CARE OF INFANTS



Weighing a Child



The Doctor Giving Advice



Teaching how to Bathe Babies

The old idea that a woman took as naturally to the rearing of her child as a duck takes to the water has been exploded like many other generalisations. Coroners' inquests are constantly proving that thousands of women know little or nothing about infants, many of whom, it appears, are fed with jam and other things from the adult breakfast table. Some of the larger cities are making it their business to teach poor women how to nurse their children.



The Lesson of the Cot



Sleeping Accommodation in an Outdoor Nursery
The cots are placed next little garden plots



Sweet Peas in a Pot

The interesting model recreation ground, 24 ft. square, provides an outdoor nursery where city children can be accommodated; sleeping and bathing out of doors



In the Outdoor Nursery
Showing the baths, the beds, and the sand beaches



A Transmogrified Back Yard—the Brick Sundial



An Outdoor Nursery—Sleeping Accommodation in the Open

residence. Nuremberg has extensive breweries, railway-carriage and lead-pencil manufactories, and produces fancy articles in metal, carved wood, ivory, etc., toys, chemicals, clocks and watches, cigars, playing-cards, etc. Printing and bookbinding are also extensively carried on, and the hop-market is the most important on the continent. The town is celebrated, in connection with its industry, for the invention of watches. Pop. 261,022.

NURSE, one who tends or takes care of the young, sick, or infirm; specifically a female hospital attendant. There are now numerous institutions where active, intelligent, and physically able women are thoroughly trained for this work. The system of sending trained nurses to a seat of war originated with Miss Florence Nightingale during the Crimean war, and organizations for military nursing during the war are now common to all civilized countries. See Red Cross.

NUT, in botany, a one-celled fruit containing when mature only one seed, and enveloped by a pericarp of a hard, woody, or leathery texture, rarely opening spontaneously when ripe. Among the best known and most valuable nuts are the hazel-nut, the Brazil-nut, the walnut, chestnut, and cocoa-nut, all of which are edible. Various other kinds of nuts are used for special purposes. Thus valonia-nuts, gall-nuts, (not strictly speaking, nuts—see Galls), and myrobalan-nuts are used in tanning and dyeing, the last two also in ink-making; betel-nuts in making tooth-powder and tooth-paste; and coquilla-nuts and vegetable-ivory (the kernel of the nut of the Peruvian palm), being very hard and capable of taking on a fine polish, are used in making small ornamental articles of turnery.

NUTCRACKER, the name of an insectivorous bird. It is generally referred to the crow family, and so placed as to approximate either the woodpeckers or starlings. The European nutcracker is about the size of the jackdaw, but with a longer tail. It combines to a considerable extent the habits of the woodpeckers and those of the omnivorous birds. It has received the name of nutcracker from its feeding upon nuts. An American species is noted for the diversified beauty of its plumage, frequents rivers and sea-shores in America.

NUTGALLS. See Galls.

NUTHATCH, the common European nuthatch is a scansorial bird, of shy and solitary habits, frequenting woods and feeding on insects chiefly. It also eats the kernel of the hazel-nut, breaking the shell with great dexterity. The female lays her eggs in holes of trees, and hisses like a snake when disturbed. Four distinct species are found in the United States; the Carolina or white-bellied, the Canada or red-bellied; the brown-headed nuthatch of the southern states and the pygmy nuthatch of the southwest.

NUTMEG, this fruit is a nearly spherical drupe of the size and somewhat the shape of a small pear. The fleshy part is of a yellowish color without, almost white within, and 4 or 5 lines in thickness, and opens into two nearly equal



White-bellied nuthatch.

longitudinal valves, presenting to view the nut surrounded by its arillus, known to us as mace. The nut is oval, the shell very hard and dark-brown. This immediately envelops the kernel, which is the nutmeg. The tree producing this fruit grows principally in the islands of Banda in the East Indies, and has been introduced into Sumatra, India, Brazil, and the West Indies. It reaches the height of 20 or 30 feet, producing numerous branches. The color of the bark of the trunk is a reddish-brown; that of the young branches a bright green. The nutmeg is an aromatic, stimulating in its nature, and possessing narcotic properties, very grateful to the taste



Nutmeg.

and smell, and much used in cookery. Nutmegs yield by distillation with water about 6 per cent of a transparent oil having a specific gravity .948, an odor of nutmeg, and a burning, aromatic taste.

NU'TRIA, the commercial name for the skins of the coypou of S. America. The overhair is coarse; the fur, which is used chiefly for hat-making, is soft, fine, and of a brownish-ash color.

NUTRITION, the act or progress by which organisms, whether vegetable or animal, are able to absorb into their system their proper food, thus promoting their growth or repairing the waste of their tissues. It is the function by which the nutritive matter already elaborated by the various organic actions loses its own nature, and assumes that of the different living tissues—a process by which the various parts of an organism either increase in size from additions made to already formed parts, or by which the various parts are maintained in the same general conditions of form,

size, and composition which they have already by development and growth attained. It involves and comprehends all those acts and processes which are devoted to the repair of bodily waste, and to the maintenance of the growth and vigor of all living tissues.

NUTRITIVENESS OF FOODS, average quantity of nutritive matter in 1,000 parts of varieties of animal and vegetable food.

Cucumber.....	25	Pears.....	160
Melons.....	30	Apples.....	170
Turnips.....	42	Haddock.....	180
Milk.....	72	Gooseberries.....	190
Cabbage.....	73	Peaches.....	200
Carrots.....	98	Codfish.....	210
White of egg.....	140	Sole.....	210
Beet-root.....	148	Pork.....	240
Cherries.....	250	Mutton.....	290
Veal.....	250	Tamarinds.....	340
Beef.....	260	Almonds.....	650
Potatoes.....	260	Oats.....	742
Apricots.....	260	Rye.....	792
Grapes.....	270	Rice.....	880
Chicken.....	270	Barley.....	920
Plums.....	290	Wheat.....	950

NUX-VOMICA, the fruit of a species of plants growing in various places in



Strychnos nux-vomica.

the East Indies. It is about the size and shape of a small orange, and has a very bitter acrid taste. It is known as a very virulent poison, and is remarkable for containing the vegeto-alkali strychnia. See Strychnine.

NYAN'ZA. See Albert Nyanza and Victoria Nyanza.

NYAS'SA, a large lake in southeastern Africa; discovered by Livingstone in 1859. The length of the lake is nearly 400 miles, and it varies in breadth from 15 to more than 50. The surface is 1570 feet above the sea-level; its waters abound in fish. On the west lies British territory, on the east the territories of Portugal and Germany. The British Central Africa protectorate occupies the western and southern shores and extends toward the Zambesi. Pop. 845,000.



Nyngha.

NYLGHAU, a species of antelope as large as or larger than a stag, inhabiting

the forests of Northern India, Persia, etc. The horns are short and bent forward; there is a beard under the middle of the neck; the hair is grayish-blue. The female has no horns. The nylghau is much hunted as one of the noblest beasts of the chase, the skin of the bull being in demand for the manufacture of native shields. The name nylghau literally means "blue ox," and has, doubtless, been applied to this animal from the ox-like proportions of its body. They are known to breed freely in confinement.

NYMPH, a term sometimes applied to denote the pupa or chrysalis stage in the metamorphosis of insects and other animals.

NYMPHÆACEÆ, aquatic plants; the water-lilies of various parts of the world. The leaves are peltate or cordate and fleshy; the stalks both of flowers and

leaves vary according to the depth of the water on the top of which the leaves



Nymphaea Lotus (white Egyptian water-lily).

float. The stems are bitter and astringent, and the seeds, which taste like those of the poppy, may be used as food,

O

O, the fifteenth letter and the fourth vowel in the English alphabet. In English O represents six or seven sounds and shades of sound: (1) as in note, go, etc. (2) The similar short sound as in tobacco. (3) The sound heard in not, gone. (4) The same sound lengthened as in mortal. (5) The sound in move, do, tomb, prove. (6) The same sound but shorter as in wolf, woman. (7) The sound of u in tub, as in come, done, love. It is also a common element in digraphs, as oo, oa, ou.

O', in Irish proper names, a patronymic prefix corresponding to the Mac of the Highlands of Scotland; thus O'Connell means "the son of Connell."

OAJACA, or **OAXACA** (ō-ā-hā'ká), a state of Mexico, on the Pacific Ocean and the Gulf of Tehuantepec; area, 33,978 sq. miles. The inhabitants are chiefly Indians. Pop. 948,633.—The capital, which has the same name, stands near the river Verde, 218 miles s.s.e. of Mexico, 4800 feet above the sea. Pop. 35,049.

OAK, the general name of the trees and shrubs, having monœcious flowers, those of the males forming pendulous catkins, those of the females solitary or in clusters, and having an involucre which forms the well-known "cup" of the fruit—the acorn. The oak from the remotest antiquity has obtained a pre-eminence among trees, and has not unjustly been styled the "monarch of the woods." The species of oak are very numerous, generally natives of the more temperate parts of the northern hemisphere, but found also in Java, Mexico, and S. America. They have alternate simple leaves, which are entire in some, but in the greater number variously lobed and sinuated or cut; evergreen in some, but more generally deciduous. For more than a thousand years ships were mainly built of common oak. The common oak attains a height of from 50 to 100 or even 150 feet, with a diameter of trunk of from 4 to 8 feet. The oak subserves a great number of useful purposes, the wood being hard, tough, tolerably flexible, strong without being too heavy, not readily penetrated

by water. The bark of the common oak-tree and of several others is preferred to all other substances for the purpose of tanning on account of the amount of tannic and gallic acid it contains. Oak galls, morbid growths caused by insects, are also much used in tanning, especially those of *Q. infectoria*. Oak bark is also used medicinally as an astringent.

OAKLAND, a town of the United States in California, on the east side of San Francisco bay, opposite San Francisco. It has some extensive industrial establishments, and is rapidly increasing. Pop. 80,000.

OAKUM, the substance of old tarred or untarred ropes untwisted and pulled into loose fibres; used for caulking the seams of ships, stopping leaks, etc. That formed from untarred ropes is called white oakum.

OAR, a long piece of timber flat at one end and round at the other, used to propel a boat, barge, or galley through the water. The flat part, which is dipped into the water, is called the blade; the other end is the handle; and the part between the two is called the loom. Oars are frequently used for steering, as in whale-boats. Sweeps are large oars used in small vessels sometimes to assist the rudder, but usually to assist the motion of the ship in a calm. A scull is a short oar of a length such that one man can manage two, one on each side.

OA'SIS, the name of the fertile spots in the Libyan desert where there is a spring or well and more or less vegetation, but now applied to any fertile tract in the midst of a waste, and often used figuratively. The oases of Northern Africa are generally river valleys, the waters of which are for the most part underground, or depressions surrounded by short ranges of hills, from which small brooks descend, sometimes forming a lake in the center. In recent times oases have been formed in the Northern Sahara by sinking artesian wells. There are many important oases in the Western Sahara, in the Libyan desert, in Arabia, Persia, and in the Desert of Gobi in Central Asia. In ancient times

and hence the Victoria Regia is called water-maize in South America. The species are mostly prized for the beauty of their flowers; as the white water-lily which grows in pools, lakes, and slow rivers.

NYMPHS, in mythology, a numerous class of inferior divinities, imagined as beautiful maidens, not immortal, but always young, who were considered as tutelary spirits not only of certain localities, but also of certain races and families. They occur generally in connection with some other divinity of higher rank, and they were believed to be possessed of the gift of prophecy and of poetical inspiration. Those who presided over rivers, brooks, and springs were called Naiads; those over mountains, Oreads; those over woods and trees, Dryads, and Hamadryads; those over the sea, Nereids.

the most celebrated oasis was that to the west of Egypt, containing the temple of Jupiter Ammon, now called the Oasis of Siwah.

OAT, or **OATS**, a genus of edible grasses cultivated extensively in all temperate climates, and though principally grown as food for horses largely used when ground into meal as human food. There are about sixty species. The cultivated species of oats are subdivided into a large number of varieties, which are distinguished from each other by color, size, form of seeds, quality of straw, period of ripening, adaptation to particular soils and climates, and other characteristics. The yield of oats varies from 20 bushels to 80 bushels per acre according to soil, etc. The weight per bushel varies from 35 to 45 lbs., and the meal product is about half the weight of the oats. Oatmeal is a cheap and valuable article of food, and its value seems to be becoming more appreciated among the wealthier classes as it is being neglected by the poorer.

OATH, a solemn assertion or promise, with the invocation of God to be a witness of the truth of what we say. Various forms have been associated with oath-taking. Thus, men have proclaimed and symbolized their promise by chopping a fowl in two, by standing within a circle of rope, by placing the hand under another's thigh, by dipping weapons into or drinking blood, or by stretching the hand upward toward the sky, and this latter gesture has established itself throughout Europe. Among the early Christians the question of oath-taking was a matter of much controversy, objection to it being founded upon Christ's command of "Swear not at all" (Matt. v. 34); but this injunction was held by Athanasius and others only to prohibit colloquial as distinct from judicial swearing. This objection is still maintained, however, by Mennonites, Quakers, Anabaptists; and the Secularists in England, upon other grounds refuse the judicial oaths. In the United States a witness may either swear or affirm. False testimony in either case amounts to perjury.

OBADI'AH, one of the twelve minor prophets, who foretells the speedy ruin of the Edomites. The prophecy was probably uttered during the period which elapsed between the fall of Jerusalem (586 B.C.) and the conquest of Edom by Nebuchadnezzar (583 B.C.).

OB'ELISK, a column of a rectangular form, diminishing toward the top, generally terminating in a low pyramid. The proportion of the thickness to the height is nearly the same in all obelisks;



Obelisks of Thothmes and Hatasou, at Karnak (Thebes), Egypt.

that is, between one-ninth and one-tenth; and the thickness at the top is never less than half, nor greater than three-fourths of the thickness at the bottom. Egypt abounded with obelisks, which were always of a single block of hard stone; and many have been removed thence to Rome and other places. They seem to have been erected to record the honors or triumphs of the monarchs. The two largest obelisks were erected by Sesostris in Heliopolis; the height of these was 180 feet. They were removed to Rome by Augustus. A fine obelisk from Luxor was erected in Paris in 1833 and the two known as Cleopatra's Needles are now in London and New York. Besides those of Egypt, monoliths of this appearance, but smaller in size, have been found in the ruined cities of Nineveh and Nimrud. The obelisks, which were common to Rome, Florence, etc., had all been removed from Egypt during its domination by the Roman emperors. See Monoliths.

OB'ELUS, a mark, usually of this form — —, or this ÷, in ancient MSS. or old editions of the classics, and indicating a suspected passage or reading.

OB'ERAM/MERGAU, a village in Upper Bavaria, celebrated for the performance, every ten years, of the passion-play of Christ's crucifixion and ascension. The performance takes place every Sunday during the summer, on a large wooden stage open to the sky, and usually lasts eight hours. Primarily regarded by these Bavarian villagers as a religious exercise, it has become in their performances a mystery play of impressive beauty. Latterly, however, it has taken the character of a European amusement and a source of profit.

O'BERON, in popular mythology, a king of the elves or fairies, and husband of Titania. He appears first in the old French poem *Huon of Bordeaux*, but is best known from Shakespeare and from Weber's opera of *Oberon*.

OBESITY. See Corpulence.

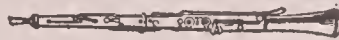
OBJECT-GLASS, in a telescope or microscope, the lens which first receives the rays of light coming directly from the object, and collects them into a focus. In the finest refracting telescopes the object-glass consists of an achromatic combination of lenses, formed of substances having different dispersive powers, and of such figures that the aberration of the one may be corrected by that of the other. The substances chiefly used are crown-glass and flint-glass.

OBJECTIVE. See Object.

OBLIGATION is a term in law which describes the bond under which a person binds himself to pay within a certain time and in the breaking of which a penalty is involved; or the tie in general by which a person is legally bound to the performance of anything.

OBLIGA'TO, or **OBBLIGATO**, in music, a part or accompaniment in a composition for a particular instrument of such character and importance that it is indispensable to the proper performance of the piece.

OBOE (ō'boi), a musical wind-instrument resembling a clarinet in shape, and sounded through a double reed. It consists of three joints besides the mouthpiece, and its compass is generally from B below the treble clef to F in alt,



Oboe.

with the intermediate semitones, being a compass of two octaves and one fifth. The name oboe is from the Italian; the French form, *hautboy*, was formerly more frequently used.

O'BRIEN, William Smith, Irish nationalist, born 1803, died 1864. He entered parliament in 1826, and subsequently joined the Young Ireland group of politicians, and advocated the use of physical force. In an endeavor (1848) to effect a rising in Tipperary, he was surrounded, arrested, tried by special commission at Clonmel, and sentenced to death, but in the end this was commuted to transportation. He was set at liberty in 1854, and fully pardoned in 1856.

OBSERVATORY, a building devoted to the observation of astronomical, magnetic, meteorological, or other natural phenomena. The astronomical observatory is the one of most general interest. Astronomical observation began at an early date in China; the pyramids in Egypt seem in some way to have been associated with stellar observation; and the first historical observatory was founded in Alexandria 300 B.C. Its work was begun by Aristillus, and continued by Timocharis, Hipparchus, Aristarchus, and others. The first European observatory was built at Nuremberg by Bernhard Walther in 1472, and this was followed in the

16th century by Tycho Brahe's famous observatory on the island of Hveen near Copenhagen, while another was erected by the Landgrave of Hesse at Cassel in 1561. Through the labors of Brahe practical astronomy became associated with the universities, so that Leyden and Copenhagen founded observatories. These were followed by the construction of the Royal Observatory at Paris (1667), the Greenwich Royal Observatory (1675), the Tusculan Observatory near Copenhagen (1704), Berlin (1705; new observatory 1835), Vienna (1756), Dublin (1785), Königsberg (1813), Sydney (1820), Cape of Good Hope (1820), Edinburgh (1825), Pulkova near St. Petersburg (1839), Cambridge, United States (1839), Washington, United States (1845), Melbourne (1853), Lick Observatory, California (1888), Yerkes Observatory, Wisconsin (1896). The chief observatory instruments are the telescope, equatorial and mural circle, and transit instrument, together with the sidereal and the solar clock. In the larger observatories the application of spectrum analysis, photography, photometry, etc., has greatly increased the number and variety of observations. The observatory building must be constructed in a very stable manner, and as the instruments must be out of contact with the walls they are attached to stone pillars that rest on foundations separate from the rest of the building.

OBSTETRICS. See Midwifery.

OCCIDENT, the western quarter of the hemisphere, so called from the decline or setting of the sun; the west: used in contradistinction to orient.

OCCULTATION is the term used in astronomy for the hiding of a star or planet from our sight by passing behind some other of the heavenly bodies, and specifically applied to the eclipse of a star or planet by the moon. The word denotes also the time during which a star or planet is so hidden from our sight.

OCCULTISM, an "occult" property of matter is, in mediæval phraseology, a property that requires to be made manifest by experimentation; and occult science is simply experimental science. The term has undergone a curious transformation of meaning. As such science was the occupation of the few, and was not seldom suspect to the reigning theology, the word "occult" gradually assumed the significance that it now possesses, of something magical or uncanny or supernatural.

OCCUPANCY, in law, the taking possession of a thing not belonging to any person, and the right acquired by such taking possession.

OCEAN, or **SEA**, the vast body of water which covers more than three-fifths of the surface of the globe. Although no portion of it is completely detached from the rest, the ocean has often been divided into several great basins or areas, viz. the Pacific ocean, which separates Asia and Australia from America; the Atlantic ocean, which separates America from Europe and Africa; and the Indian ocean, which intervenes between Africa and Australia, together with the Arctic and the Antarctic oceans, round the north and south poles respectively. Between these no

very definite limits can be drawn; thus it is impossible to say where the Atlantic or the Pacific ends and the Antarctic or Southern ocean begins. The bed of the ocean appears to present the same irregularities as the surface of the land, being diversified by rocks, mountains, plains, and deep valleys. The deepest soundings at present known are 5155 fathoms (in the South Pacific), 4655 fathoms (northeast of Japan), and 4561 fathoms (north of Porto Rico). (See Atlantic Ocean, Pacific Ocean, etc.) The waters of the ocean vary as greatly in temperature as they do in depth. This is partly due to the ordinary effects of isolation; but the abrupt changes and anomalous distribution of temperature is chiefly owing to currents. (See Currents, Marine.) The Pacific and Indian oceans are both warmer in low latitudes than the Atlantic, and the mean temperature of the equatorial areas at the surface is assumed to be $81^{\circ}.5$; the warmth of the North Atlantic is anomalous, and due to the influence of the Gulf Stream. This high temperature only applies to the surface water of the ocean, for experience shows that in both hemispheres and in all latitudes the basic water of the ocean is exceedingly cold. In low latitudes water at 32° has been drawn from great depths; while in high latitudes water at 26° has been found. This phenomenon is accounted for by the supposition that the cold water at the poles, by reason of its specific gravity, sinks to the bottom and spreads throughout the ocean basin. The saltiness of the ocean is due to the presence of various saline ingredients (chiefly chloride of sodium or common salt), which are generally found in the proportion of from 30 to 40 per thousand. Recent observations have shown that the color and transparency of the water of the ocean are in a large measure dependent on the degree of saltiness. In general it is found that the greater the saltiness the greater the transparency, and also that where the saltiness is very great the water is of a dark-blue color, that where it is less the water is of lighter blue, inclining to green, and that in the neighborhood of rivers (where the saltiness is reduced to a minimum) the water is as a rule of a greenish-yellow.

OCEANIA includes all the islands of the Pacific between Asia on the northwest, the Indian ocean on the west, the Antarctic ocean on the south, and America on the north and east. It is usually divided into Australasia, Polynesia, and Malaysia or the Malay Archipelago.

OCEANUS, in Greek and Roman mythology, the eldest of the Titans, regarded as the god of the ocean or the river surrounding the earth, and the parent of the Oceanides or ocean nymphs.

OCELOT, a digitigrade carnivorous mammal of the cat kind peculiar to the American continent. It attains a length of about 3 feet, while the tail measures some 18 inches more. The ocelot inhabits great forests; its food consists mainly of birds and rodents; and it is timid but bloodthirsty.

OCHRE, a combination of peroxide of iron with water; but the name is generally applied to clays colored with the

oxides of iron in various proportions. Considerable quantities of ochre are obtained from the ferruginous mud separated from tin and copper ores; and it is also found in natural beds some feet thick in the more recent formations. Ochres vary in color from a pale sandy yellow to a brownish red, and are much used in painting.



Ocelot.

O'CONNELL, Daniel, Irish agitator born in Kerry in 1775. He studied for the Irish bar, and soon became distinguished for legal skill and oratory. Turning his energy to Irish politics he advocated Catholic Emancipation; skillfully kept the agitation within constitutional lines; became member for Clare in 1828; and attained his triumph in the following year when the government of the Duke of Wellington granted the Catholic claims. After the Reform Bill he became conspicuous as the head of a parliamentary body called "O'Connell's Tail." In 1841 he developed his policy, called together enormous meetings throughout Ireland, and loudly raised a cry for the Repeal of the Union. This agitation Sir R. Peel and the government determined to put down. They arrested O'Connell, obtained a conviction, and sentenced him to twelve months' imprisonment with a fine of \$10,000. In a few months the House of Lords quashed this judgment. Meanwhile, however, a new and more advanced party had sprung up in the Repeal Association, and the health of O'Connell was broken down. He made his last speech in parliament April, 1847, and died the following month at Genoa, on his way to Rome.

OCTAGON, in geometry, is a figure of eight sides and angles, which when the sides and angles are all equal is called a regular octagon, and when they are not equal an irregular octagon.

OCTAHEDRON, in geometry, a solid contained by eight equal and equilateral triangles. It is one of the five regular bodies.

OCTANT, in astronomy, that position or aspect of a heavenly body, as the moon or a planet, when half-way between conjunction or opposition and quadrature, or distant from another point or body the eighth part of a circle or 45° . The word is also applied to an instrument for measuring angles, resembling a sextant or quadrant in principle, but having an arc the eighth part of a circle, or 45° .

OCTAVE, in music, an interval of seven degrees or twelve semitones above or below some sound counted from; or one sound eight tones higher than another. The octave is the most perfect of the chords, consisting of six full tones and two semitones major. It contains

the whole diatonic scale. The most simple perception that we can have of two sounds is that of unisons, or sounds of the same pitch, the vibrations beginning and ending together. The next to this is the octave, where the more acute sound makes precisely two vibrations while the grave or deeper makes one; consequently, the vibrations of the two meet at every single vibration of the more grave one. Hence the ratio of the two sounds that form the octave is as 1 to 2. See Music.

OCTAVIA, daughter of Caius Octavius and of Atia, and sister to the Emperor Augustus, illustrious for her virtues, her beauty, and her accomplishments, was the widow of Claudius Marcellus, by whom she had a son and two daughters, when she was married, at the instance of her brother, to the triumvir Mark Antony. The latter neglected her for Cleopatra, queen of Egypt; notwithstanding which, Octavia displayed the most noble fidelity to his house and fortunes, and devoted herself to the education of all his children, until he divorced and ordered her to leave his house, a command she obeyed without complaint. She died in 11 B.C.

OCTAVIUS, or **OCTAVIANUS** See Augustus.

OCTAVO, the size of one leaf of a sheet of paper folded so as to make eight leaves: usually written 8vo; hence, a book having eight leaves to the sheet. There are different sizes of octavo, arising from the different sizes of paper employed; as, foolscap 8vo, demy 8vo, imperial 8vo.

OCTOBER, originally the eighth month in the Roman calendar, whence its name, which it still retained after the beginning of the year had been changed from March to January.

OCTOPUS, familiarly known as cuttle-fishes. They have eight arms, each with two rows of suckers, which are sessile or unstalked. The prominent head is joined to the body by a distinct neck, and the body itself is short, generally more or less rounded in shape, and unprovided with side or lateral



The common octopus or cuttle.

fins. They have attained a notoriety from tales circulated concerning their ferocity and the existence of gigantic members of the genus, though the largest cuttle-fishes that have been met with have belonged to other genera. The common cuttle is found on the British shores, but is more common in the Mediterranean. It is said to reach a length of 9 feet and a weight of 68 pounds, the arms being long and slender.

ODDFELLOWS, a large and extensively ramified friendly society, having its headquarters in Manchester. It was originally an association of a convivial kind, modeled on freemasonry, and still retains watchwords and secret signs. It assumed its present form at a convention in Manchester (1813), and has spread widely in Britain and elsewhere. The organization was introduced into the United States in 1819, and severed its connection with the British Union in 1842. Branch societies connected with England or the United States have been founded in Australia, New Zealand, South Africa, South America, etc.

ODE, a poem of lyrical character, supposed to express the poet's feelings in the pressure of high excitement, and taking an irregular form from the emotional fervency which seeks spontaneous rhythm for its varied utterance. The Greeks called every lyrical poem adapted to singing—and hence opposed to the elegiac poem—an ode (ōdē, that is, song). The principal ancient writers who employed this form of verse were Pindar, Anacreon, Sappho, Alcæus, among the Greeks, and Horace among the Romans. As employed by English writers the ode takes either the Pindaric form of strophe, antistrophe, and epode irregularly arranged and contrasted; or, as in its later development, the form of a regular series of regular stanzas. The former style is found in Dryden's Ode for St. Cecilia's Day, while the latter is seen in Shelley's Ode to a Skylark. The masters of English poesy who have carried the ode to its highest achievements are Milton, Dryden, Collins, Gray, Coleridge, Wordsworth, Keats, and Shelly.

ODESSA, a Russian seaport in the government of Kherson, situated on the Black Sea, between the mouth of the Dnieper and Dniester, on the bay of Odessa. Odessa is one of the chief wheat ports in the East, while wool, timber, hemp, flax, iron, coal, etc., are among the staple exports. Besides the maritime trade, Odessa carries on a large overland trade by rail with Germany, Austria, France, Switzerland, and Italy. Pop. 405,041.

ODIN, or **WODEN**, the chief god of Scandinavian mythology, the omniscient ruler of heaven and earth, having his seat in Valaskjalf, where he receives through his two ravens tidings of all that takes place in the world. As war-god he holds his court in Valhalla, where all brave warriors arrive after death and enjoy the tumultuous pleasures they delighted in while on earth. His wife is Frigga. The fourth day of the week, Wednesday, derived its name from this deity.

ODOACER, the first barbarian king or ruler of Italy after the fall of the Western Empire, A.D. 476 to 493. He was chosen head of the barbarian confederates, and having overthrown Romulus Augustulus, the last of the Roman emperors, he assumed the title of king in 476. He ruled with vigor and wisdom. In 489 Italy was invaded by the Ostrogoths under Theodoric, and in repeated battles Odoacer was defeated, being latterly besieged in Ravenna, on the fall of which he was assassinated.

ODONTOGLOSSUM, an extensive genus of orchids, natives of Central America, much prized by cultivators



Odontoglossum.

for their magnificent flowers, which are remarkable both for their size and beauty of their colors.

ODYSSEUS (o-dis'ūs). See Ulysses.

OD'YSSEY, an epic poem attributed to Homer, in which the adventures of Odysseus (Ulysses) are celebrated. See Homer.

ŒCUMENICAL, universal, an epithet applied to the general councils of the church. From the time of the Council of Chalcedon (451) the patriarchs of Constantinople took the title of œcumenical, in the same sense as the epithet Catholic is used in the Western Church. See Council.

ŒDIPUS, in ancient Greek legend, son of King Laius of Thebes, was exposed as an infant—on account of an oracle saying that Laius would be killed by his son—and was brought up at the court of Corinth. Having solved the riddle of the Sphinx he became king of Thebes, unknowingly killed his own father and married his mother Jocasta a fate foretold by the Delphic oracle. On realizing what had been done Jocasta hanged herself, and Œdipus put out his own eyes. This story has been used by the poets to symbolize the helplessness of man before Fate. The Œdipus of Æschylus and Euripides are lost, but the King Œdipus and Œdipus at Colonos of Sophocles remain. The story has also been made the subject of tragedies by Corneille, Voltaire, Chénier, Dryden and Lee.

ŒSOPH'AGUS, or **GULLET**, the membranous and muscular tube which leads from the pharynx or back part of the mouth to the stomach. In man the length of the gullet is from 9 to 10 inches. It begins at the fifth cervical or neck vertebra, at a point corresponding with the cricoid cartilage of the larynx, and it runs in a slightly deviating course downward to the stomach. Thus in the neck it lies close behind the windpipe; while in the chest it bends to the right side and then to the left before it pierces the midriff or diaphragm—which forms the floor of the chest—by a special aperture existing in that structure. Internally the gullet is lined by mucous membrane, and between the mucous and muscular layers cellular tissue exists. The mucous or lining membrane is thick and of pale color, and is arranged in longitudinal furrows or folds.

In the lower animals the modifications of the œsophagus are various. In birds, for instance, it presents the expansion known as the crop.

OFFEN. See Budapest.

OFFA, a distinguished king of Mercia, who attained the throne after Ethelbald, on defeating the usurper Beornred, A.D. 757. He founded the Abbey of St. Albans, and was a liberal patron to the church. He died in 796.

OFFENBACH, Jacques, French composer, born of Jewish parents at Cologne in 1819, died 1880. He entered the Paris Conservatoire in 1835; became proficient on the violoncello, and for some time played on this instrument in the orchestra of the Théâtre Comique. In 1847 he became conductor at the Théâtre Français, and subsequently opened the "Bouffes Parisiens," where he enjoyed immense popularity as the composer of such operas as *Orphée aux Enfers*, *La Grande Duchesse*, *La Belle Hélène*, *Madame Favart*, *La Barbe Bleue*, *Geneviève de Brabant*, and *La Princesse de Trebizonde*.

OFFERTORY, that portion of the service of the Eucharist in which the offerings of the congregation are made, whether these consist of bread and wine or alms. The term is used in the Roman Catholic Church to denote that portion of the mass which is being sung when the priest offers the bread and wine; while in the Church of England it is applied to the sentences read from the service when the alms are being collected, or is applied to the alms themselves.

OFFICERS, Military and Naval. In the army, general officers are those whose command extends to a body of forces composed of several regiments, as the general, lieutenant-general, major-generals, and brigadiers. Staff-officers, those who belong to the general staff, as the quartermaster-general, adjutant-generals, aides-de-camp, etc. See Navy, Army and Relative Rank In.

OFFING, a nautical term signifying the position of a vessel, or of a portion of the sea within sight of land, relatively to the coast. The offing may be taken to represent that part of the sea beyond the midline between the coast and the horizon.

OG, king of Bashan at the time of the conquest of Canaan by the Israelites, by whom he and his people were destroyed. He has been transformed by rabbinical fables into one of the giants who lived before the flood, and escaped the general inundation by taking refuge on the roof of Noah's ark.

OGDEN, the capital of Weber co., Utah, at the confluence of the Ogden and Weber rivers, the mouth of Ogden cañon, and the foot-hills of the Wasatch mountains; on the Union Pac., the Central Pac., and the Rio Grande West. railways; 37 miles n. of Salt Lake City. It derives excellent power for industrial purposes from the rivers, has an abundant supply of water from mountain springs, and is in an agricultural, fruit-growing, iron, salt, lime, buildingstone, and coal region. Pop. 19,512.

OGDENSBURG, a city in St. Lawrence co., N. Y., at the confluence of the St. Lawrence and the Oswegatchie

river; on the Central Vt. and the Rome, Watertown and Ogdensburg railways; opposite Prescott, Canada, with which it is connected by steam ferry; 175 miles n.n.w. of Albany. The city is the headquarters of a line of screw steamers plying between Chicago and intermediate lake ports, and annually handles a large amount of grain and lumber, besides general lake and river freight. Pop. 14,272.

OGLESBY (o'g'lyz-bf), Richard James, American soldier and politician, was born in Oldham co., Ky., in 1824. He moved to Illinois and served as a lieutenant in the Mexican war, participating in the battles of Vera Cruz and Cerro Gordo. During the gold excitement of 1849 he crossed the continent to the mining districts of California, but returned in 1851. In 1860 he was elected state senator but preferred to join the Union forces in the civil war. He was made major-general. In 1864 he was elected governor of Illinois, and re-elected in 1872. He was United States senator from 1873 to 1879, and was again elected governor in 1885. He died in 1899.

OHIO, a river in the United States of America, formed by the confluence of the Alleghany from the north and the Monongahela from the south, at Pittsburgh in Pennsylvania, where it is a navigable stream 600 yards broad. It flows w.s.w., separating the states of W. Virginia and Kentucky on the south from Ohio, Indiana, and Illinois on the north, and enters the Mississippi at Cairo. Its length from Pittsburgh to its junction with the Mississippi is 975 miles; area of basin, 214,000 sq. miles. The width of the river varies from 400 to 1400 yards; average width, about 800 yards, at its mouth 900 yards. Its principal affluents are the Miami, Kentucky, Wabash, Cumberland, and Tennessee.

OHIO, a state in the American Union which ranks fourth in point of population and agricultural products, is bounded on the north by Lake Erie and the state of Michigan, west by Indiana, south by Kentucky, southeast and east by West Virginia, and northeast by Pennsylvania; area, 20,760 sq. miles. It ranks thirty-second in size among the states. In the north the surface is generally level, and in some places marshy; in the east and southeast it is rugged and broken by hills, but never rises into mountains. In its natural state Ohio was covered with dense forests; now they cover but about one-fifth, the trees most abundant being several varieties of oak, maple, ash, black and white walnut, chestnut, beech, poplar, sycamore, linden, etc. The drainage is divided between the Ohio and Lake Erie. The former, which receives the far larger share, bounds the state partly on the east and wholly on the south, and is augmented from within it by the Mahoning, Beaver, Muskingum, Hocking, Scioto, and the Great and Little Miami; the latter, which washes the northern frontier for 160 miles, receives the Maumee, Portage, Sandusky, Huron, Cuyahoga, Grand, and Ashtabula. The climate is pleasant and healthful, though variable. The average annual rainfall is 39.35 inches,

very evenly distributed through the year.

In the southeastern part the soil is formed directly from the decomposition of the underlying rocks, while in the remaining area, covering nearly two-thirds of the state, it consists of glacial drift of great fertility. This soil contains a great percentage of limestone material in the west, while in the northeast it consists chiefly of clay, and is well adapted for wheat-growing. The alluvial soil deposited along the river courses is excellent for the raising of Indian corn. The extreme northwestern part of the state exhibits certain features of prairie country. Both the upper and lower coal measures contains several workable



Seal of Ohio.

seams interbedded between strata of shale, limestone, sandstone, and clay, and ranging in thickness from two to over a dozen feet. The interbedding strata of the coal measures yield fire-clay and building stone, and here also are found the iron ores of the carbonate variety. Gypsum and salt deposits also occur at various places. One of the most remarkable events in the mineralogical development of Ohio was the discovery in 1884 of petroleum in the Trenton limestone formation of Lower Silurian age. This formation as well as the Upper Silurian inclosed also considerable reservoirs of natural gas.

Petroleum was discovered in 1884 and the output of the state exceeds that of any other. The petroleum is obtained in two sections of the state, the southeast and northwest. The former is known as the eastern district, and the latter—themore important—as the Lima district. In a third region, known as the Mecca-Belden district, small quantities of lubricating oil are obtained. The utilization of the state's natural gas resources is also of recent development. There are two gas fields corresponding in a general way with those of petroleum.

Ohio ranks first in the annual value of clay products, contributing 17.3 per cent of the total output for the country. The state regularly ranks first in the figures for the sandstone product. Limestone, iron, and the carbonate variety of ore are found in many places; 93.9 per cent of the total land area is in farms. The proximity of large city markets and the excellence of the transportation facilities help to stimulate agriculture. The area of corn, wheat, and hay each exceeds three

million acres. Oats are also extensively grown, but this crop decreased in area during that decade. Rye, barley, and buckwheat are not extensively raised. Ohio is one of the largest producers of Irish potatoes, sweet corn, tomatoes, cabbage and tobacco. Ohio is probably the largest producer of temperate zone orchard fruits. The region around Lake Erie is especially favored for fruit-raising. This region has become noted for its numerous and extensive vineyards. Large quantities of small fruits are grown. Horses, sheep, cattle, and swine are reared in great numbers. Coal and iron are abundant, particularly in the northeast, while salt, marble, limestone, freestone, and gypsum are found in many districts. The more important manufactures are bar, sheet, and railway iron, machinery, hardware, and various articles in metal; leather, woolen, cloth, paper, and spirits. Cotton, silk, flax, and mixed goods are also made to some extent. The foreign trade, carried on chiefly with Canada across Lake Erie, is comparatively small; but a very extensive inland trade is carried on both by the Ohio and by numerous canals and railways, which traverse the country in every direction. Ohio ranks fifth in its total railroad mileage, and in its mileage per 100 sq. miles of area, 21.61 miles, it is exceeded by only one other of the large states. Among the higher educational establishments are the university at Athens; several denominational universities and colleges; schools of law, medicine, and theology. Ohio sends two senators and twenty-one representatives to Congress, and has twenty-three votes in the presidential election.

Ohio was discovered by La Salle, probably as early as 1670, and the French took formal possession of the whole northwest in 1671. A few years later conflicting claims arose between the French and the English regarding this territory, which were set at rest by the Treaty of Paris in 1763, by which France surrendered to Great Britain all her lands in the north and west as far as the Mississippi. In 1787 the Ohio Company of Associates was organized in New England by those who had served in the war of the revolution, and under their auspices a large tract of land was purchased from the government in the territory northwest of the Ohio river. This was the first public sale of land by the United States government. In connection with its sale the famous "Ordinance of 1788," was passed, guaranteeing forever in the territory civil and religious freedom, the system of common schools, trial by jury, and the right of inheritance. In 1288 Marietta and Cincinnati were founded, and till 1791 settlements in the southern part of the territory increased rapidly. In that year the Indians became troublesome. Late in 1794 a victory was gained by Gen. Anthony Wayne over the Indians at "Fallen Timbers" on the Maumee river. The year after, a treaty of peace was concluded, the Indians ceding a great portion of the territory, which settlers began at once to fill. Chillicothe was made the seat of government for the

territory, and a capitol building erected. In 1802 a constitution was adopted for the eastern division of the territory northwest of the Ohio, to be known as "Ohio," and on Feb. 19, 1803, Ohio was admitted into the Union.

The state supplied more than its quota of troops for the Mexican war, and at the outbreak of the civil war was exceedingly active. Seventy regiments responded to the first call for troops, though only thirteen were asked. Soldiers were sent into Virginia and helped to save West Virginia to the Union, and the prompt action of Governor Dennison had its influence upon Kentucky also. A large number of the most successful federal officers were natives of the state, as Grant, Sherman, McDowell, Rosecrans, Garfield, and others.

Ohio was democratic in national elections from the time of its admission to 1836. In that year it voted with the whigs and since then has been whig and republican with the exception of the years 1848 and 1852 when it cast its vote for Cass and Pierce. The two largest towns are Cincinnati and Cleveland, others being Toledo and Dayton and Columbus. Pop. about 4,600,000.

OHIO STATE UNIVERSITY, a co-educational state institution at Columbus, Ohio. It was founded in 1870 as the Ohio Agricultural and Mechanical college, and opened in 1873. The university comprises six colleges: Arts, philosophy and science; agriculture and domestic science; engineering; law; pharmacy; veterinary science. The college confers the bachelor's degree in course in the various departments, and the engineer's, master's, and doctor's degrees for advanced work. Military instruction and the wearing of a uniform are required of the students. A laboratory is maintained at Sandusky for summer work.

OHIO UNIVERSITY, a coeducational state institution at Athens, Ohio, organized in 1804. Besides the collegiate department, the university has schools of music and commerce, a preparatory department, and a normal college. The bachelor's degree in arts, philosophy, science, and pedagogy is given in course and the master's degree after one year's graduate work. Tuition is free.

OHM (Ωm), Georg Simon, German physicist, born 1787, died 1854. He became successively professor of physics at Cologne, director of the Polytechnic at Nuremberg, and professor of physics at the University of Munich. He was the discoverer of what is known as "Ohm's Law" in electricity.

OHM, the unit of resistance to the passage of electricity. A piece of pure copper wire 485 meters long and 1 millimeter in diameter at 0° C. has a resistance of about one ohm. A "megohm" is a resistance equal to 1,000,000 ohms, and a microhm is a resistance equal to one-millionth of an ohm.

OHM'S LAW, an important law in electricity, deduced by Professor Ohm, to the effect that the intensity of the electric current is directly proportional to the whole electro-motive force in operation, and inversely proportional to the sum of the resistances in the circuit.

OIL-CAKE, a cake or mass of compressed linseed or rape, poppy, mustard, cotton, and other seeds from which oil has been extracted. Linseed-cake is much used as a food for cattle, its value as a fattening substance being greater than that of any kind of grain or pulse. Rape-cake is used as a fattening food for sheep. These and other oil-cakes are also valuable as manures.

OIL CITY, a city in Venango co., Pa., at the junction of the Allegheny river and Oil creek; on the Allegheny Valley, the Erie, the Lake Shore and Mich. South., and the West. N. Y. and Pa. railways; 8 miles e.n.e. of Franklin, the county seat, 18 miles s. of Titusville. It is in the center of the great petroleum-oil district. Pop. 15,310.

OIL-GAS, the inflammable gas and vapor (chiefly hydrocarbon) obtained by passing fixed oils through red-hot tubes, and which may be used like coal-gas for purposes of illumination. The oil in its passage through the retorts is principally decomposed, with the production of ethylene, marsh-gas, hydrogen, carbonic oxide, benzene, etc., a gas being thus produced which has the great advantages of being pure from sulphureous contamination, and of supporting a very brilliant flame with a very small expenditure.

OIL OF VITRIOL, the common name of strong sulphuric acid.

OIL-PAINTING. See Painting.

OIL-PALM, an African tree abounding on the west coast of that continent, whose fruit yields palm-oil. See Palm-oil.

OILS, a term given to substances formed within living animal or vegetable organisms, liquid at ordinary temperatures, having a more or less viscid consistency, insoluble in and lighter than water, taking fire when heated in air, and burning with a more or less luminous flame. The oils are usually divided into the fat or fixed oils, and the volatile or essential oils. Another division would be into vegetable oils, by far the most numerous, and animal oils; and as a third popular division, the mineral oils (petroleum, naphtha). The fat or fixed oils are subdivided into the drying and the non-drying oils. The former class includes all oils which thicken when exposed to the air, through the absorption of oxygen, and are converted thereby into varnish, as, for example linseed, nut, poppy, and hemp-seed oil. All the drying oils are of vegetable origin. The non-drying oils (which are partly of vegetable, partly of animal origin) when exposed to the air also undergo a change resulting in the formation of acid, disagreeably-smelling, acid substances, but though they thicken they do not become dry. The fixed vegetable oils (whether drying or non-drying) are generally prepared by subjecting the seeds of the plant to pressure, with or without heat, and they may also be extracted by means of certain solvents. The animal oils are, for the most part, the fluid parts of the fat of the animal, and are separated by heat alone. Vegetable fixed oils all consist of one or more proximate principles. Thus olive-oil contains chiefly olein, with a little stearin; linseed-oil is composed mainly

of linolein. The most important of the drying oils are linseed, hemp, walnut, poppy, candle-nut, sesame, sunflower, madia, safflower. Of the non-drying oils the chief are olive, cotton-seed, colza, rape, ground-nut, castor, croton, etc. A certain number of the vegetable oils are also known as vegetable fats, from their consistency at ordinary temperatures, such as palm-oil, cocoanut oil, shea-butter. The animal oils comprise neat's-foot oil, train-oil, seal-oil, sperm-oil, porpoise-oil, cod-liver oil, shark-oil, etc. The uses of the fixed oils are very various. Many are used as articles of food, others are used in medicine, numbers as lubricants, some in the composition of paints and varnishes; some are important sources of artificial light, and generally when acted on by an alkali they form soaps. A use of oil now coming into some importance is as an agent for calming the waves of the sea in certain circumstances, more especially to prevent them from breaking over a boat and so swamping her.

Volatile oils are generally obtained by distilling the vegetables which afford them with water; they are acrid, caustic, aromatic, and limpid; they are mostly soluble in alcohol, forming essences. They boil at a temperature considerably above that of boiling water, some of them undergoing partial decomposition. A few of them are hydro-carbons the greater number, however, contain oxygen as one of their ultimate elements. They are chiefly used in medicine and perfumery; and a few of them are extensively employed in the arts as vehicles for colors, and in the manufacture of varnishes, especially oil of turpentine. They are very numerous, among them being the oils of anise, bergamot, clove, cinnamon, cajeput, lavender, lemon, lime, orange, mint, peppermint, nutmeg, marjoram, rosemary, thyme, etc.

OISE, a northern department in France, Beauvais is the chief town. Pop. 403,146.

OKLAHOMA, one of the United States, bounded on the N. by Kansas, on the E. by Missouri and Arkansas, on S. by Texas, on W. by Texas and New Mexico, area, 70,430 sq. miles. It exceeds in area twelve of the states, or an area greater than the whole of New England. It has mostly the character of a prairie, and considerable portions are bare and arid, though others are very fertile. Its rivers are chiefly the Red river and its tributaries, and the Canadian river, the Cimarron and other tributaries of the Arkansas. It produces crops of wheat, corn, oats, cotton, sorghum, millet, etc., while large numbers of cattle are reared. Oklahoma is making extraordinarily rapid advances in prosperity, and now possesses well-built towns, an extensive system of railways, many public schools and institutions.

The soil is formed by the decomposition of the underlying rock formations, and consists chiefly of red clay and sandstone material. In the river valleys these are mixed with a rich black alluvium, and the soils are generally of sufficient depth to be of almost inexhaustible fertility. There are some

forests of oak, walnut, and hickory in the east, but the western plains are generally treeless, and covered with grama drop-seed, and bunch grasses, while in the extreme west are found sage-brush, yucca, and cactus.

Oklahoma is preëminently an agricultural and stock-raising region. The development of agriculture since the territory was opened to settlement has been phenomenal. The cotton yield per acre is in excess of that of any other state or territory. Corn and wheat lead in importance. Other cereal crops are oats, Kafir corn, barley, and rye. Hay and forage, potatoes, sorghum, melons, peanuts, castor beans, and broom corn



Seal of Oklahoma.

are also produced. Fruit is also grown, over 6,000,000 peach trees bearing fruit. The western part of the state is given up to cattle-raising, which flourished before the region was opened to settlement. The number of cattle has increased prodigiously since that time. Horses, mules, and swine are also important, and some sheep are raised. The flouring and grist-mill industry is the most prominent of the manufactures. Cotton-ginning and the manufacture of cotton-seed oil are next in importance. Wheat is much the largest export. Coal, asphalt, oil, natural gas, granite, marble, gypsum, lead, and zinc, are produced. The state has nearly 6,000 miles of railroad.

Oklahoma was a part of the Louisiana Purchase, and was included in the "un-organized or Indian country" set apart by congress in 1834. The Creek Indians (June 14, 1866) ceded to the United States the western part of their domain in Indian Territory, for 30 cents an acre, while the Seminoles gave up their entire holdings for 15 cents an acre. The Sacs and Foxes, Cheyennes, and other tribes were settled upon part of these lands, but great tracts remained unoccupied. In 1890 the territory of Oklahoma was created. In 1891 almost 300,000 acres of land, formerly belonging to the Sac and Fox, Pottawatomie, Shawnee, Cheyenne, and Arapahoe Indians, was thrown open to settlement, and in 1893 the Cherokee strip of 6,000,000 acres was also opened. The first Legislature met at Guthrie, August 27, but spent almost the entire session quarreling over the location of the capital, which remained at Guthrie. The agitation for statehood began in 1891,

and a bill admitting Oklahoma as a State passed the House of the Fifty-seventh Congress, but failed to reach a vote in the Senate. In June, 1906, it was provided by Congress that Oklahoma and the Indian Territory might adopt a constitution and become a state.

In September, 1907, the constitution was submitted to the people and was adopted by an overwhelming majority. In November, 1907, the state was admitted to the union. In 1908 the state went Democratic.

Indians of various tribes form an important element in the population. Guthrie is the capital. Oklahoma City is also an important center. Pop. 1,414,042.

OKLAHOMA CITY, a city and capital of Oklahoma co., Okl., on the North Canadian river, and the Atch., Top. and Santa Fé railroad; 25 miles s. of Guthrie. The city is the largest cotton-market in Oklahoma; contains flour-mills, cotton-gins, brick-yards, packing-houses, and several hotels; and has a large trade in agricultural products and lumber. Pop. 12,415.

OLAF, or **ST. OLAF**, one of the most celebrated of the Norwegian kings, great-great-grandson of Harald Haarfager, and son of Harald, chief of the district of Gränland, was born about 995. He was a friend of the Normans, and fought as an ally of Ethelred's in England. He afterward established himself on the throne of Norway, and was a zealous supporter of Christianity. Canute the Great having landed in Norway with an army, Olaf fled to Russia, and in attempting to recover his dominions he was defeated and slain at the battle of Stiklestad (1030). Since 1164 he has been honored as the patron saint of Norway. The order of St. Olaf, a Norwegian order given in reward for services rendered to king and country or to art and science, was founded in 1847.

OLBERS, Heinrich Wilhelm Matthæus, a German astronomer, born in 1758, died 1840. He directed his attention particularly to comets, and in 1815 he discovered a new one, which bears his name. Another discovery for which he is still better known is that of two minor planets, Pallas in 1802, and Vesta in 1807.

OLDENBURG, a grand-duchy in the north of Germany, consisting of three separate and distinct territories, viz.: the duchy of Oldenburg, the principality of Lübeck, and the principality of Birkenfeld; total area, 2479 sq. miles. Pop. Oldenburg, 318,434; Lübeck, 37,340; Birkenfeld, 43,406; total, 399,180. The capital is Oldenburg (see next article).

OLDENBURG, a town of Germany, capital of the grand-duchy of same name, 24 miles w.n.w. of Bremen, on the Hunte (which is navigable). It has fine promenades on the site of the old fortifications, a grand-ducal palace, public library of 150,000 volumes, picture-gallery, gymnasium, manufactures of glass, leather, earthenware, etc. Pop. 26,797.

OLDHAM, a town of England, in Lancashire, 6 miles northeast of Manchester. Pop. parl. bor. 194,197; mun. bor. 137,238.

OLD RED SANDSTONE, a geological term made popular by the writings of Hugh Miller, and applied by him to the red sandstone which underlies the carboniferous system, in contradistinction to the New Red Sandstone, which overlies the latter. It is now generally included in the Devonian system. See Geology.

OLD STYLE. See Calendar.

OLD TESTAMENT. See Bible.

OLEANDER, a plant known also by the name of rose-bay, a beautiful evergreen shrub, with flowers in clusters, of a fine rose or white color but of an indifferent smell. The plant, especially the bark of the root, is medicinal and poisonous.

OLEASTER, also called wild olive tree, a small tree of the south of Europe and west of Asia, cultivated especially for its blossoms, which are very fragrant.

OLEF'ANT GAS, the name originally given to ethylene or heavy carburetted hydrogen. It is a compound of carbon and hydrogen and is obtained by heating a mixture of two measures of sulphuric acid and one of alcohol. It was discovered in 1796. It is colorless, tasteless, and combustible, and has an aromatic odor not unlike that of oil of caraways.

OLE'IC ACID, an acid resulting from the action of olive and some other oils upon potash. It enters largely into the composition of soaps, forming with potash soft soap and with soda hard soap.

OLENEK, a river of Northern Siberia which rises under the polar circle, and enters the Arctic ocean to the west of the Lena delta; length, about 1200 miles.

OLEOMARGARIN. See Margarine.

OLFAC'TORY NERVES, the nerves of smell, the first pair of cerebral nerves or nerves from the brain. They arise chiefly in connection with the cerebral hemispheres, and numerous filaments from them, perforating the ethmoid bone, are distributed over the mucous membrane of the nose. See Nose.

OL'IGARCHY, that form of government in which the supreme power is placed in the hands of a small exclusive class.

OL'IGOCLASE, a soda-lime felspar, the soda predominating; it occurs in granite, porphyry, and other igneous rocks.

OLIPHANT, Mrs. Margaret, maiden name Wilson, novelist, born near Musselburgh, Scotland, 1828; died 1897. Her first novel appeared in 1849 under the title of *Passages in the Life of Mrs. Margaret Maitland*, and since then she has maintained a high place as a novelist. Besides this she has written a *Life of Edward Irving*, *lives or memoirs of Francis of Assisi*, *The Makers of Florence*, *The Makers of Venice*, *The Makers of Modern Rome* a *Literary History of England in the Nineteenth Century*, etc.

OLIVA'REZ, Gaspar de Guzman, Count of, Spanish statesman, born in 1587, died 1645. He was educated at the University of Salamanca, afterward appointed gentleman of the bed-chamber to the Prince of Asturias, and when his royal master succeeded to the throne as Philip IV. Olivarez was appointed prime-minister. For twenty-two years (1621-43) his power was almost unlimited, but the severity of his adminis-

tration ultimately caused revolt in Catlonia and Andalusia, while the Portuguese threw off the Spanish yoke. The end of his policy was public discontent and his own private disgrace. He was confined by the king at Toro, where he died.

OLIVE, a fruit-tree of which there are several species, the most important being the common olive. It is a low branching evergreen tree, in height from 20 to 30 feet, with stiff narrow dusky-green or bluish leaves. The flowers are small and white and are produced in axillary racemes. The fruit is a berried drupe of an oblong spheroidal form, with a thin, smooth, and usually blackish skin, containing a greenish soft pulp adherent to a rough, oblong, and very hard stone. It is bitter and nauseous, but replete with a bland oil. The olive is a native of Syria and other Asiatic countries, and flourishes only in warm and comparatively dry parts of the world. It grows slowly, and is very long-lived. The olive-tree has in all ages been



Olive.

held in peculiar estimation. It was anciently sacred to Minerva. Olive wreaths were used by the Greeks and Romans to crown the brows of victors, and it is still universally regarded as an emblem of peace. The wood of the olive-tree is beautifully veined, and has an agreeable smell. It is in great esteem with cabinet-makers on account of the fine polish of which it is susceptible. But the olive-tree is principally cultivated for the sake of its oil, which is contained in the pericarp or pulp. It is cultivated for this purpose in Italy, France, Spain, Malta, European and Asiatic Turkey, the Ionian Islands, etc., and is easily propagated either by seed, grafting, or slips. It is very tenacious of life. The fruits are also used at table, not in the natural state, but generally pickled, the green unripe fruits being deprived of part of their bitterness by soaking them in water, and then preserved in an aromatized solution of salt. Another species of olive inhabits China, Japan, and Cochinchina. The flowers are used by the Chinese to mix with and perfume their tea, and also, together with the leaves, for adulterating tea. The only American species is in some districts called devil-wood on account of the excessive hardness of the wood and the extreme difficulty of splitting it.

OLIVE-OIL, a fixed oil obtained by expression from the pulp of the ripe fruit of the olive. It is an insipid, inodorous, pale-yellow or greenish-yellow, viscid fluid, unctuous to the feel, inflammable, incapable of combining with water, and nearly insoluble in alcohol. It is the lightest of all the fixed oils. Olive-oil is much used as an article of food in the countries in which it is produced, and to a smaller extent in other countries, to which it is exported also for medicinal and manufacturing purposes, etc. The best olive-oil is made in the vicinity of Aix, in France; the kind known by the name of Florence oil is also of a superior quality, and is mostly used for culinary purposes. By far the largest portion of olive-oil is imported from Italy. Spain also sends a large quantity. The oil is also known as Sweet-oil.

OLIVES, MOUNT OF, or MOUNT OLIVET, a hill on the east side of Jerusalem, from which it is separated by the Valley of Jehoshaphat and the brook Kedron. The principal summit has the name of Mount of Ascension, and here stands the modern Armenian church of that name. But according to the Scriptures the scene of the ascension was near to Bethany (Luke xxiv. 50), which is on the further side of the hill from Jerusalem. A short way above Bethany is a nearly flat part of the hill on which hundreds of people might congregate, and there is little doubt that that is truly the place from which our Lord ascended. At the foot of the hill lay the Garden of Gethsemane, and round its eastern and southern side is the road by which our Lord made his triumphal entry into Jerusalem.

OL'IVINE, called also chrysolite, is a mineral, olive-green in color, occurring in lava, basalt, and certain meteorites. Analysis proves it to be a silicate of iron and magnesium.

OLLA PODRI'DA, the name of a favorite dish with all classes in Spain. It consists of a mixture of all kinds of meat cut into small pieces, and stewed with various kinds of vegetables. Hence the term is also applied to any incongruous mixture or miscellaneous collection.

OLLIVIER (o-liv-i-ā), Emile, born at Marseilles 1825. When the empire was established in France Ollivier gradually severed himself from his former political associates, and the severance was final when he, in January, 1870, accepted Napoleon's invitation to form a ministry. It was this ministry which declared war with Germany in July, 1870, and which was overthrown with disgrace in August, 1870. He is the author of numerous works.

OLMSTED, Frederick Law, American landscape architect, was born in 1822. In 1848 he purchased a fruit-farm on Staten Island, near New York, and while successfully managing it, studied landscape gardening. In 1850 he made a pedestrian tour through England and portions of the Continent, an account of which was given in his *Walks and Talks of an American Farmer in England*, 1852. In 1855 he made a tour through France, Italy, and Germany, for the purpose of observing parks and rural grounds. In 1856 he secured the prize

for the best plan of laying out the New York Central Park, and was appointed architect and chief engineer. From 1864 to 1866 he spent in California, when he was made one of the commissioners of the National Park of the Yosemite. He returned to New York in 1866, and had charge of the laying out of the Brooklyn Prospect Park. He has since been associated in designs for parks and other public works at Washington, Chicago, San Francisco, and other cities. He planned also the approach from Pennsylvania avenue to the capitol in Washington, was first commissioner of the Yosemite Park, and prominent in the Niagara Falls Reservation committee, and in devising the system of parks and parkways in and around Boston. He died in 1903.

OLNEY, Richard, American politician, born in Oxford, Mass., in 1835. He was admitted to the Boston bar in 1859. Olney rose rapidly in his profession, and was for many years chief counsel for the Eastern railroad, and later for other roads. He was a democratic member of the lower house of the Massachusetts legislature in 1874. In 1893 he was offered the place of attorney-general of the United States by President Cleveland and accepted it. Upon the death of Gresham, in 1895, Olney became secretary of state, and continued to hold that position until the end of Cleveland's administration in 1897. His famous letter to Bayard, Minister to England, for the information of the English government as to the American position in the Venezuelan dispute, attracted great attention both in this country and in Europe.

OLYMPIA, a locality in Greece, the scene of the famous Olympic games, a beautiful valley or plain lying in the middle portion of the ancient district of Elis, in the western part of the Peloponnesus (Morea). Here were collected thousands of statues of the gods and of victors in the games, treasure-houses full of votive offerings, temples, altars, tombs, and in a word the most precious treasures of Grecian art. Among the buildings were the Olympiæum or great temple of Zeus, containing the colossal statue of the god by Phidias; the Heraeum or temple of Hera; the Metroum or temple of the mother of the gods; the twelve treasure-houses; the Prytanæum, in which the Olympic victors dined after the contest; the Bouleuterion, in which all the regulations regarding the games were made; and these were all surrounded with walls, having a length of about 1800 feet and a breadth of 1500. Recent excavations have brought to light numerous valuable works of art, besides remains of ancient buildings, etc.

OLYMPIADS, the periods of four years between each celebration of the Olympic games, by which the Greeks computed time from 776 B.C., the first year of the first Olympiad, till 394 A.D., the second year of the 293d Olympiad.

OLYMPIAS, the wife of Philip II., king of Macedonia, and the mother of Alexander the Great. Her haughtiness and more probably her infidelity, led Philip to repudiate her, and to marry Cleopatra, the niece of King Attalus.

The murder of Philip, which soon followed this disgrace (B.C. 336), some have attributed to the intrigues of Olympias. After the death of her son and his successor Antipater she was besieged by Cassander in Pydna, and, having to surrender, she was put to death after a mock trial (316 B.C.).

OLYMPIC GAMES, the great national festival of the ancient Greeks, celebrated at intervals of four years in honor of Zeus, the father of the gods, on the plain of Olympia (which see). The festival commenced with sacrifices, followed by contests in racing (foot, horse, chariot), wrestling, boxing, etc.; and closed on the fifth day with processions, sacrifices, and banquets to the victors. The victors by way of prize were merely crowned with garlands of wild olives; and on their return home they were received with extraordinary distinction, and enjoyed numerous honors and privileges.

OLYMPUS, the name given to several mountain ranges by the ancients. The most celebrated of them was situated in Thessaly, at the eastern extremity of the range called the Cambunian Mountains, and now called by the Greeks Elymbos or Olymbos. It rises to the height of 9700 feet above the level of the sea, and was the highest mountain in ancient Greece. The earliest Greeks looked upon it as the highest of all mountains, as the central point of the earth's surface, and as the place where the gods dwelt. In after-times, when the ideas of men respecting the universe and the gods were enlarged, the supreme beings were said to reside in the exterior sphere of the heavens revolving round the space which embraced the planets; and this new abode of the gods above the firmament of heaven received the name of Olympus. The other most important elevation bearing this name was the Mysian Olympus, a range of lofty mountains in the northwest of Asia Minor, now called Kheshish Dag, Ala Dag, Ishik Dag, and Kush Dag. Olympus in Cyprus may also be mentioned.

O'MAHA, the capital of Douglas co., Nebraska, situated on the Missouri, about 600 miles from its confluence with the Mississippi and 500 miles west of Chicago. It is an important railway center for the northwest. It possesses large silver-smelting works, steam engine and boiler works, soap-works, breweries, etc., and it is the center of a large mining and agricultural district. The population, which in 1880 was 30,000 is now 145,555. South Omaha, a suburb of the above, is now one of the largest pork and beef packing centers in the states, its population being estimated at 15,000.

OMAN (o-mān'), or **MUSKAT**, a sultanate in the southeast of Arabia, partly on the Persian gulf, partly on the Indian ocean. The capital is Muskat. Pop. (estimated), 1,600,000.

OMAR KHAYYAM, Persian poet, astronomer, and mathematician, born at Nishapur in Khorasan, died there 1123 A.D. His scientific works, which were of high value in their day, have been eclipsed by his Rubaiyat, a collection of about 500 epigrams in praise of wine, love, and pleasure, and at the

same time, depressingly pessimistic. There is an admirable poetic translation of the Rubaiyat or Quatrains by Edward Fitzgerald (1859).

OM'EGA, the name for the Greek long o. The last letter in the Greek alphabet, as alpha is the first; and from the expression in Revelation (chap. i. 8), "I am Alpha and Omega, the beginning and the ending." Inscriptions on tombstones, public documents, etc., very often began with these two letters, meaning, "In the name of God."

O'MENS, certain signs or phenomena supposed to portend some impending good or evil fortune. Among the ancient Romans the taking of omens was a public institution of great importance. See Augurs, Auspices.

OMNIBUS, a Latin word signifying "for all," and now applied in several languages to the well-known vehicle used for the conveyance of passengers. The first conveyances of the kind were those which came into use in Paris (March, 1662) in consequence of an edict of Louis XIV., but they soon fell into disuse, and were not again reintroduced until 1827. A Mr. Shillibeer started the first omnibus in London in 1829, and they were introduced into New York in 1830, and Amsterdam in 1839.

OMNIBUS BILL, a term applied to single legislative acts in which are incorporated a number of loosely related measures. The term was first applied to a bill for the admission of California to the Union with a constitution prohibiting slavery. Many omnibus bills were passed by state legislatures, but provisions requiring that single statutes shall deal with but one main subject, which shall be clearly indicated in the title have proved fatal to the "omnibus bill."

ONEIDA (o-nī'da), a lake in the state of New York, United States, the western and lower end of which is about 18 miles southeast of Lake Ontario. It is 20 miles long, 4 miles broad, and its waters find a vent by Oneida river into Lake Ontario at its southeast corner, after they have united with the Seneca and formed the Oswego river.

ONEIDA COMMUNITY, a religious communistic society, otherwise known as Perfectionists (which see).

ONEIDAS, once a North American Indian tribe or nation belonging to the confederacy of the Hurons, and inhabiting Central New York. A remnant of them now inhabit a reservation in Wisconsin, and are well advanced in civilization.

O'NEILL, Peggy (Margaret O'Neill Eaton), was born in Washington in 1796. As the wife of Major J. H. Eaton, Jackson's secretary of war, she was the subject of a social war in government circles owing to certain charges connecting her name with that of Major Eaton while she was still wife of Purser Timberlake, her first husband. It was said that from this social disturbance an estrangement arose between Gen. Jackson and Calhoun, leading to the nomination of Van Buren for the presidency of 1836. She died in 1879.

ONION, a well-known liliaceous plant, the bulbous root of which is much used as an article of food. It is a biennial

herbaceous plant with long tubulated leaves, and a swelling, pithy stalk. The peculiar flavor varies much according to the size of the bulb, the small reddish onions having much more pungency than the larger ones. The onion may be grown from the tropics to the coldest verge of the temperate zone. There are at least twenty varieties, the Strasburg, Spanish, and Portuguese being among the most esteemed.

ONTARIO, formerly called Upper Canada and Canada West, a province of the Dominion of Canada, having Manitoba on the west; Kewatin and James bay on the north; Quebec on the east; and on the southeast, south, and southwest the St. Lawrence river, and Lakes Ontario, Erie, Huron, and Superior; area, 220,000 sq. miles. Besides the great lakes just mentioned, which partly belong to the Canadian Dominion and partly to the United States, Ontario has numerous other lakes, such as Simcoe, Nipissing, Nipigon, Lake of the Woods, etc. The chief rivers are boundary rivers: the Ottawa, Niagara, and Albany, the latter entering James bay, part of Hudson bay. The Falls of Niagara in part belong to the province. There are no mountains of importance. Agriculture is the chief occupation, and for the most part the soil is of excellent quality. A large part of the province is covered with timber, and this, with the water facilities, make lumbering one of the chief industries. The climate is inclined to the extreme of hot and cold during summer and winter respectively, but the dryness of the atmosphere makes it very healthy. The minerals include copper, iron, nickel, gypsum, marble, salt, and petroleum. The richest, most thickly settled, and most highly cultivated portion of the province is the peninsula between the St. Lawrence and Lakes Ontario, Erie, and Huron. The crops raised are chiefly wheat, barley, oats, Indian corn, and potatoes, and the fruit-growing farms of some districts yield a plentiful crop of apples, plums, pears, peaches, and grapes. Latterly the farmer here has turned his attention to stock-raising and dairy-farming with encouraging results, which are largely due to the easy accessibility of markets by rail, supplemented by the lake, river, and canal navigation. Chief among the manufactures are woolens, cotton, linen, hardware, paper, soap, agricultural implements, steam-engines, etc. The educational system of the province provides for the free education of all children in the common schools, and there is also liberal government provision for high schools and colleges, technical institutions, and a university; while there are also colleges and universities not under provincial control. The government is administered at Toronto by a lieutenant-governor, assisted by an executive council of seven; while there is also a legislative assembly, elected by ballot for four years, and constituting with the lieutenant-governor the legislature or parliament. Pop. 2,250,678.

ONTARIO, Lake, the most easterly of the great lakes of North America, lying along the northeast side of the state of New York, and forming part of the boundary between the United States

and Canada; greatest length, 190 miles; greatest breadth, about 55 miles; area, 5400 sq. miles. It receives the waters of Lake Erie by the Niagara, and discharges its waters by the St. Lawrence into the Atlantic, 1000 miles distant. The Hudson, and the Oswego and Erie canals, form a connection through the United States between it and the Atlantic. It is navigable throughout its whole extent and at all seasons. The most important places on its shores are Toronto, Hamilton, Kingston, and Coburg, in Canada, and Oswego in the United States.

ONTOL'OGY, the doctrine of being; a name given to that part of the science of metaphysics which investigates and explains the nature and essence of all things or existences, their qualities and attributes. It is also used as equivalent to metaphysics.

ONYX, a semi-pellucid gem with variously-colored zones or veins. Any stone exhibiting layers of two or more colors strongly contrasted is called an onyx, as banded jasper, chalcedony, etc., but more particularly the latter when it is marked with white and stratified with opaque and translucent lines. The ancients valued it very highly, and used it much for cameos, many of the finest cameos in existence being of onyx.

ONYX MARBLE, a very beautiful translucent limestone of stalagmitic formation discovered by the French in the province of Oran, Algeria, and first brought into general notice at the London exhibition of 1862. It is used for the manufacture of ornamental articles.

OPAL, a precious stone of various colors, which comes under the class of pellucid gems. It consists of silica with about 10 per cent of water, and is very brittle. It is characterized by its iridescent reflection of light. It is found in many parts of Europe, especially in Hungary, in the East Indies, etc. The substance in which it is generally found is a ferruginous sandstone. There are many varieties or species, the chief of which are: (a) precious or noble opal, which exhibits brilliant and changeable reflections of green, blue, yellow, and red; (b) fire opal, which simply affords a red reflection; (c) common opal, whose colors are white, green, yellow, and red, but without the play of colors; (d) semi-opal, the varieties of which are more opaque than common opal; (e) hydrophane, which assumes a transparency only when thrown into water; (f) hyalite, which occurs in small globular and botryoidal forms, with a vitreous luster; (g) menilite, which occurs in irregular or reniform masses, and is opaque or slightly translucent. Formerly the opal was believed to possess magical virtues; thus it was believed to confer invisibility when wrapped in a bay-leaf.

OPEN-BILL, an African bird of the stork family, so named from the odd formation of the beak, which at the anterior end exhibits a gap between the mandibles as if part of them were worn away though they meet at the points. Their chief food is molluscs, and perhaps this formation of bill has something to do with the opening of the shells. Another species inhabits the East Indies.

OPEN DOOR, a term in international politics which came into general use in 1899, and has reference to the equality of commercial opportunity in China of all nations. The enunciation of the open-door policy had its origin in the acquisition by various European powers of commercial ports in China and the insistence of the United States that such ports should be open to all the world on equal terms.



Open-bill.

OP'ERA, a musical drama, that is, a dramatic composition set to music and sung on the stage, accompanied with musical instruments and enriched by the accessories of costumes, scenery, dancing, etc. The component parts of an opera are recitatives, solos, duets, trios, quartettes, choruses, etc., and they are usually preceded by an instrumental overture. The lighter kind of opera, as well as the French opera comique, is of a mixed kind—partly spoken, partly sung. The chief varieties of opera are the grand opera or opera seria, the name given to that kind which is confined to music and singing, of which the recitative is a principal feature; the romantic opera, or opera drammatica of the Italians, embracing an admixture of the grave and lively; the comic opera, or opera buffa; as well as many intermediate varieties. Though the Greek dramas were operatic in character, the opera proper is of modern date and of Italian origin, and would seem to have developed naturally from the miracle-play of the middle ages, the first operas dating from the 16th century.

OPERA BOUFFE (buff), a farcical form of opera buffa in which the characters, subject-matter, and music is intended to burlesque the more serious style of opera. Offenbach was the creator as well as the chief master in this art. The comic operas of Gilbert and Sullivan, both in the character of the music and the libretti, stand by themselves.

OPERA-GLASS, a small binocular telescope of a low magnifying power, so called from its use in theaters. The two tubes are connected together, and have their foci adjustable by turning a milled-headed screw between them. See Telescope.

OPHICLEIDE (of'i-klid), a brass wind-instrument of music invented to supersede the serpent in the orchestra and in military bands. It generally consists of a wide conical tube, terminating

in a bell like that of a horn, with a mouth piece and ten holes or ventages which are stopped by keys. Ophicleides are of



Ophicleide.

two kinds, the bass and the alto; the former has a compass of three octaves and one note, ranging from B on the third space below the bass-staff to C on the third space of the treble-staff, including all the intermediate semitones. The alto ophicleide (an inferior instrument) has the same extent of compass but starts an octave higher.

OPHTHALMIA, an inflammation of the mucous membrane which covers the globe of the eye, and of the corresponding surface of the eyelids. It is either acute or chronic, and its commonest cause is the presence of irritating matter between the eyelids or the exposure of the membrane to sudden cold. Its characteristic marks are pain, redness, a feeling as if sand were in the eye, and a copious flow of matter.

OPHTHALMOSCOPE, an instrument for observing the internal structure of the eye. It consists of a mirror (plane in that of Coccius, concave in that of Desmarres), by which light from an artificial source is directed into the eye of the patient, and a double-convex lens, by which the illumined parts of the structure of the eye are magnified in order that they may be more easily examined, the observer looking through a hole in the center of the mirror. The light is usually placed to the side of and slightly behind the patient's head.

OPIUM, the inspissated juice of a species of poppy cultivated on a large scale principally in Hindustan and in Asiatic Turkey, but well known in many places as a garden plant, being an annual with white, red, or violet flowers and glaucous leaves. The opium is the juice that flows from incisions made in the green heads or seed-capsules of the plant after the fall or removal of the petals, and the best flows from the first incision. The juice is at first a milky liquid, but soon solidifies and turns black, and is then scraped off and collected. It is one of the most energetic of narcotics, and at the same time one of the most precious of all medicines, and is employed in a great variety of cases, but most commonly for the purpose of procuring sleep and relief from pain. In medicine it is very commonly used in the form of laudanum, which is a simple tincture or extract in spirits of wine; it is also an ingredient in various patent and other remedies. Another opium preparation is morphine. In its natural state opium is heavy, of a dense texture, of a brownish-yellow color, not perfectly dry, but easily receiving an impression from the finger; it has a faint smell, and its taste is bitter and acrid. The chief active principle of opium is morphia, or morphine in combination with meconic acid. The principal part of our supply of opium is brought from Turkey, whence it is imported in flat pieces or cakes, covered

with leaves. In the case of many temperaments opium produces such agreeable effects, whether a delightful dreamy calm, a state of pleasant exhilaration, or beatific visions, that numbers of persons are led to use it habitually, as others use alcohol in some form, though over-indulgence in it is attended with at least as evil effects as over-indulgence in the latter. But like tobacco it is taken by vast numbers without any apparent result one way or other. Some habitual takers of opium can take as much in a day as would kill ten or twenty persons unaccustomed to it. It is taken in two ways, known as opium-eating and opium-smoking. The habitual use of opium is most common in China, the southeast of Asia, and the Malay Archipelago, where it is chiefly smoked in a special pipe. The pipe, or rather the stem of the pipe, is about the length and size of an ordinary flute; the bowl is generally made of earthenware. The smoker, who is always lying, or at least reclining, takes a small portion of opium about the size of a pea on the end of a spoon-headed needle, heats it at a lamp, and then places it in the bowl of the pipe, the pellet of opium having pre-



Opium poppy.

viously been perforated with the needle. He then brings the opium to the flame of the lamp, inhales the smoke in several inspirations, and is then ready to repeat the process with a fresh quantity of opium until the desired intoxication ensues. Large quantities of opium are consumed in China, a great part of which comes from India, though probably as much or more is produced in China itself. The Indian opium, however, is preferred to their own by the best judges among the Chinese.

OPORTO, a large city and seaport of Portugal, the second in the kingdom, capital of the province of Entre Douro e Minho, on a steep declivity on the right bank and about 2 miles from the mouth of the Douro, 170 miles north of Lisbon. Pop. 172,421.

OPOS'SUM, the name of several species of marsupial mammals, having four hands and a long prehensile tail. They are nocturnal animals, arboreal in their habits, living constantly on trees, and there pursuing birds, insects, etc., although they do not despise fruit. The females of certain species have an abdominal pouch in which are the mammae, and in which they can inclose their young. The best-known species of opossum is common in the United States. It is almost the size of a large cat, the general color whitish-gray, and

the whole hair of a wool-like softness. On the ground the motions of the opossum are awkward and clumsy, but on the branches of a tree it moves with



Common opossum.

great celerity and ease, using the prehensile tail to assist its motions. When caught or threatened with danger the opossum counterfeits death, and "playing 'possum" has on this account passed into a proverb as used to indicate any deceitful proceeding. The female has from ten to fifteen young, which are for a long time nourished in the pouch, to which they resort when alarmed.

OPPOSITION, in astronomy, the situation of two heavenly bodies when diametrically opposed to each other, or when their longitudes differ by 180° . Thus there is always an opposition of sun and moon at every full moon; also the moon or a planet is said to be in opposition to the sun when it passes the meridian at midnight. See Conjunction.

OPS, the Roman female divinity of plenty and fertility. She was regarded as the wife of Saturn, and, accordingly, as the protectress of everything connected with agriculture.

OP'TATIVE, in grammar, that form of the verb in which wish or desire is expressed, existing in the Greek and some other languages, its force being conveyed in English by such circumlocutions as "may I," "would that he," etc.

OPTICS is the branch of physics which treats of the transmission of light, and its action in connection with the laws of reflection and refraction, including also the phenomena of vision. A

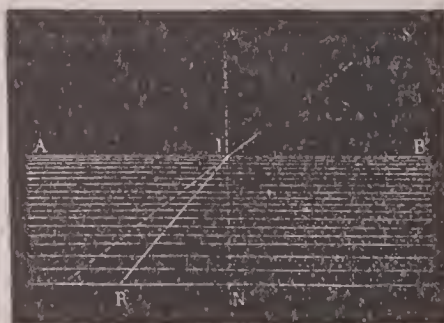


Fig. 1.—Refraction.

ray of light is the smallest conceivable portion of light, and is represented by the straight line along which it is propagated. A pencil of light is a collection

of such rays; it is parallel when all the component rays are parallel to each other; converging when they all proceed to a single point; and diverging when they all proceed from a single point. The focus of the pencil is the point to or from which the rays proceed. Any space or substance which light can traverse is in optics called "a medium." When light falls on any surface a certain portion of it is reflected or sent back, and it is owing to this reflected light that objects are visible. When light falls upon the surface of a solid substance or medium that it can traverse (a transparent substance), one portion greater or less is directed or reflected back into the medium whence it came; another portion is transmitted through the solid medium, but undergoes a change called refraction; while a third portion is absorbed in the new medium. When all the minute parts of a surface give out rays of light in all directions we call it a luminous surface, whether it is self-luminous or is merely reflecting the light from a self-luminous body such as the sun. The law of reflection is that the angle of incidence and that of reflection are in the same plane, and that the angle of reflection is equal to the angle of incidence, and on the opposite side of the perpendicular. The law holds true whatever be the nature of the reflecting

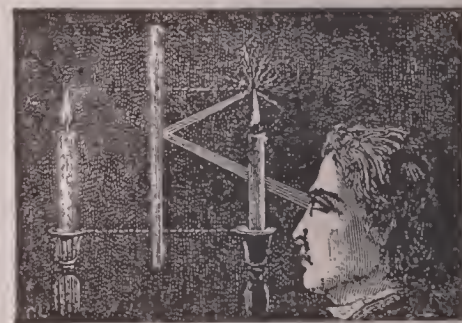


Fig. 2.—Reflection (plane mirror).

surface or the origin of the light which falls upon it. The law of refraction comes into operation when a ray of light passes through a smooth surface bounding two media not homogeneous, such as air and water, or when rays traverse a medium, the density of which is not uniform, as the atmosphere. When the ray of light passes from a rarer into a denser medium, it is bent or refracted toward the perpendicular line drawn through the point of incidence, or the angle of refraction is less than the angle of incidence. On the contrary, when a ray of light passes from a denser into a rarer medium the refraction is from the perpendicular, or the angle of refraction is greater than the angle of incidence. If one medium is a liquid and the other air, as in the accompanying figure (fig. 1), the ray *ri* in the liquid will make a smaller angle with the normal *ni* than the ray *si* in air, and vice versa.

The law of reflection is illustrated especially by the action of mirrors. When a pencil of rays from a luminous point falls on a plane mirror each ray is reflected according to the law given above, and it is easy to show by geometry that the pencil which was divergent

before incidence has exactly the same divergence after reflection; but the rays now seem to have proceeded from a point behind the mirror. This point is called the "virtual image" of the first point (being not a real image of it); the line joining the points is at right angles to and is bisected by the mirror. Now a luminous object is made up of points, each of which sends a divergent pencil to the mirror, which seems after reflection to proceed from a point behind the



Fig. 3.—Reflection (concave mirror).

mirror, and hence a luminous object sends rays to a plane mirror which after reflection seem to have proceeded from a luminous object behind the mirror. An eye receiving a ray (or a small pencil or rays) gets the impression that the luminous point from which it was sent is somewhere in the line of the ray just before reaching the eye, and hence an eye in such a position as to receive after reflection a few rays from every point of the object sees the image of the object. (See fig. 2.) Besides plane mirrors concave and convex mirrors are often used in optics. When a mirror is not plane the incident rays from a luminous point in general neither converge to a single point after reflection nor diverge as if they had come from a virtual image. But when a concave mirror forming a small portion of a spherical surface is used we find that all the rays falling upon it from a luminous point converge so nearly to a luminous point after reflection that their "aberration" (as the non-convergence of the rays is called) may be neglected in practice. The line joining the center of the spherical sur-

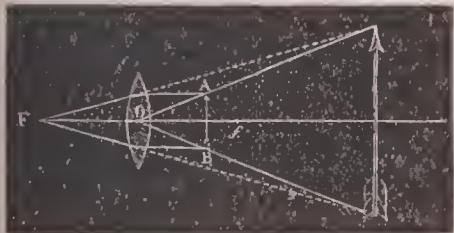


Fig. 4.—Magnification of near object by convex lens.

face with the "pole" of the mirror (that is, the middle point of the reflecting surface) is called the principal axis. Any bundle of rays parallel to the principal axis converges after reflection to a point in the axis called the principal focus; and any bundle of parallel rays converges after reflection to a focus which is at the same distance from the mirror as the principal focal distance. When the object from which the rays proceed is at a considerable distance, an inverted image of it will be formed midway between the center of curvature

and the mirror. When the object is only at a moderate distance, but exceeding half the radius of curvature, an inverted image is still formed in front of the mirror, being diminished when nearer the mirror than the object is, and magnified when farther away than the object. The image of an object placed nearer a concave mirror than the principal focus is erect and larger than the object, and is "virtual" as in fig. 3, where a b is the object, ba its image (inverted), f the focus, c the center of curvature. The image of any object in a convex mirror is also virtual and erect; it is, however, smaller than the object.

When the two faces of a piece of glass through which light is refracted are both of them plain, it is called a plate if they are parallel, and a prism if they are not parallel. When the faces are curved, or one of them curved and the other plain, it is called a lens. Prisms are the essential parts of the apparatus used for decomposing light and examining the properties of its component parts, as in spectrum analysis. (See Light.) A lens may be regarded as consisting of an unlimited number of prisms, the angles between their faces gradually diminishing the farther away from the axis of the lens. It is the property of convex lens to diminish the divergency of the pencils of light, of concave lenses to increase that divergency. It is the duty of a convex lens to make rays parallel to the axis falling on one face of its converge accurately to one point after emerging from the other face. This point is called the principal focus, and is the point where a "real" image would be formed. When rays parallel to the axis pass through a concave lens they diverge, and if produced backward in the direction from which they come they would meet at one point, which in this case also is called the principal focus; but it is only a virtual focus, because the rays themselves do not pass through it, but only their backward productions. Thus concave lenses bend rays from the axis, and convex ones bend them toward it. When we look through a concave lens it makes objects seem smaller whatever their distances are. When we look through a convex lens at an object between the lens and the principal focus it appears larger than it really is, and hence the use of such lenses in magnifying glasses, microscopes, and telescopes. The rule as to the relative size of object and image will be understood from fig. 4, where the small arrow a b is the object, and the large arrow its image, o being the center of the lens, f f its foci. Rays from a b are refracted toward the axis by the lens, and as the visual angle, or angle made by the rays at the eye, is larger than if there were no lens, the object appears magnified. The length of the object and the image will be directly as their distance from o; so that if the image is three times as far from the lens as the object, it will be three times as long and three times as broad. Convex lenses are used in spectacles for long-sighted (or old-sighted) persons, because the lens of their eye is too much flattened and does not of itself cause a sufficient convergency of the rays to make an image on the retina, but one that would

fall behind it. Concave lenses, again, are used by near-sighted persons, because the rays in their case converge so much as to make an image in front of their retina instead of on it. See Eye, Light, Microscope, Telescope, Spectroscope, etc.

OPTIMISM, that philosophical doctrine which maintains that this world, in spite of its apparent imperfections, is the best possible. It is an ancient doctrine; among modern philosophers Leibnitz is its principal advocate.

OPTOMETER, an instrument for measuring the extent of the limits of distinct vision in different individuals, and consequently for determining the focal lengths of lenses necessary to correct imperfections of the eye.

ORACLES, the answers which the gods of the Greeks, Romans, Egyptians, etc., were supposed to give, by words uttered or otherwise, to those who consulted them upon any occasion; also the places or sources whence these answers were received. The credit of oracles was so great that vast numbers flocked to them for advice. Scarcely any war was waged, or peace concluded, or new forms of government instituted, or new laws enacted, without the advice and approbation of some oracle. The Greek oracles were the most celebrated, the earliest being that of Zeus (Jupiter) at Dodona. Of the other gods Apollo had many oracles, but that at Delphi held the first place, and it was often applied to for explaining obscure answers obtained at Dodona. Another famous oracle of Apollo was in the island of Delos. The Romans had no important oracles of their own, but had recourse to those of Greece and Egypt. The early Christians ascribed the oracles in general to the operation of the devil and his agents; but the practices of the priests, the manner and circumstances of delivering the oracles, the ambiguity of their answers, and the art of accommodating them to all events, amply demonstrate their human origin; yet they long maintained their standing, and sunk only with the freedom and independence of Greece. Under the reign of Theodosius the temples of the prophetic deities were shut up or demolished.

ORAN, a seaport of Algeria, capital of department of same name. Pop. 88,235, of whom about three-fourths are Europeans.—The department, forming a long belt along the Mediterranean, has an area of 74,510 sq. miles, and a population of 1,107,354.

ORANG, or **ORANG-OUTANG**, a quadrumanous mammal, one of the anthropoid or man-like apes or monkeys. This animal seems to be confined to Borneo, Sumatra, and Malacca. It is one of those animals which approach most nearly to man, being in this respect only inferior to the chimpanzee and gorilla. It is utterly incapable of walking in a perfectly erect posture. Its body is covered with coarse hair of a brownish-red color; in some places on its back it is 6 inches long, and on its arms 5 inches. The face is destitute of hair save at the sides. It attains the height of from 4 to 5 feet, measured in a straight line from the vortex to the heel. The arms reach to the ankle-joint. The hind-legs are

short and stunted, the nails of the fingers and toes flattened. They swing themselves along from tree to tree by the aid of their long arms, but their gait on the ground is awkward and unsteady. At birth the head of the orang resembles



Female orang-utan.

that of the young child. These apes are remarkable for strength and intelligence, and capable of being highly domesticated if captured young. They feed chiefly on fruits and sleep on trees. See also Man, Apes, Monkeys.

ORANGE, the fruit of the *Citrus Aurantium*, and the shrub or tree itself. The orange is indigenous in China, India, and other Asiatic countries, and was first introduced in Portugal about 1520. It is now extensively cultivated in Southern Europe. In Portugal and Spain the fruit forms an important article of commerce. Large quantities are also produced in the Azores, in Africa, America (especially in Florida and California), and the West Indies, in Australia and the Pacific Islands. The tree is a middle-sized evergreen, with a greenish-brown bark. The leaves are ovate, acute, pointed, and at the base of the petiole are winged. The white flower exhibits a calyx with five divisions, a corolla with five imbricate petals, stamens equal in number to the petals or a multiple of them, and along with the petals inserted on a hypogynous disc, the filaments being united in several bundles. The fruit is globose, bright yellow, and contains a pulp which consists of a collection of oblong vesicles filled with a sugary and refreshing juice; it is divided into eight or ten compartments, each usually containing several seeds. The principal varieties are the common sweet or China orange, the bitter or Seville, the Maltese or red-pulped, the Tangerine, the Mandarin or clove, and the St. Michael's. The leaves, flowers, and rind yield fragrant oils much used in perfumery and for flavoring essences. The wood is fine-grained, compact, susceptible of a high polish, and is employed in the arts. The citron and lemon are allied fruits.

ORANGE CITY, a city in New Jersey, 16 miles west of New York. It is picturesquely situated on elevated ground, and contains many fine residences, being a favorite resort of New York City men. Pop. 26,115.

ORANGE-LILY, a species of lily having a scaly bulb, a leafy stem 2½ feet high, small dark brown bulbs in the

axils of the leaves, and large orange-colored flowers.

ORANGEMEN, the members of a secret society founded in the north of Ireland in 1795, to uphold the Protestant religion and political ascendancy, and to oppose the Catholic religion and influence and their secret societies. The title of the association was adopted in honor of William III. of England, prince of Orange. The head of the association is the Imperial Grand Lodge with its imperial grand-master; then there are grand lodges, grand county lodges, districts and subordinate lodges, spread over Ireland, Great Britain, and some of the colonies, especially Canada, but the chief strength is in the north of Ireland. In 1835 the society was dissolved in consequence of intrigues in the army, but revived in 1845. Great demonstrations take place annually on the 12th of July, the anniversary of the battle of Aghrim.

ORANGE RIVER, or **GARIEP**, a river in South Africa, forming part of the north boundary of Cape Colony, and falling after a total course of about 650 miles into the Atlantic.

ORANGE RIVER COLONY, a British possession in South Africa, having the Cape Colony on the s. and s.w., Transvaal on n. and n.w., Natal and Basutoland on e. and s.e., area about 50,000 sq. miles; pop. 207,503, of whom about 78,000 are whites.

ORATORIO, a sacred musical composition consisting of airs, recitatives, duets, trios, quartets, choruses, etc., with full orchestral and sometimes organ accompaniment, the subjects being generally taken from Scripture.

ORBIT, in astronomy, the path of a planet or comet; the curve-line which a planet describes in its periodical revolution round its central body. The orbits of the planets are elliptical, having the sun in one of the foci; and the planets all move in these ellipses by this law, that a straight line drawn from the center of the sun to the center of any one of them, termed the radius vector, always describes equal areas in equal times. Also, the squares of the times of the planetary revolutions are as the cubes of their mean distances from the sun. The satellites also move in elliptical orbits, having their respective primaries in one of the foci. The elements of an orbit are those quantities by which its position and magnitude, for the time, are determined; such as the major axis and eccentricity, the longitude of the node, and inclination of the plane to the ecliptic, and the longitude of the perihelion.

ORCHARD, an inclosure devoted to the culture of fruit-trees, especially the apple, the pear, the plum, the peach, and the cherry. The most suitable position for an orchard is a declivity lying well exposed to the sun and sheltered from the colder winds, but yet not too much shut in. The soil should vary according to the kind of fruit cultivated, and it is generally allowed to produce only grass besides the fruit-trees.

ORCHESTRA (or'kes-tra), the space in theaters between the seats occupied by the spectators and the stage, appropriated by the Greeks to the chorus

and the musicians, by the Romans to the senators, and in our modern theaters to the musicians. The name is also used for the part of concert-rooms assigned to the vocal and instrumental performers; and, lastly, is applied to the instrumental performers, collectively taken. A modern orchestra in the last sense consists of stringed, wind, and percussion instruments, in varied proportions, according to the number of instrumentalists.

ORCHIDACEÆ (or-ki-dā'sē-ē), or **ORCHIDS**, an extensive order of endogens (nearly 2000 species being known), consisting of herbaceous plants or shrubs, with fibrous or tuberous roots; a short stem or a pseudo-bulb; entire, often sheathing leaves; and showy flowers, with a perianth of six segments in two rows, mostly colored, one, the lowest, generally differing in form from the rest, and often spiral. The essential form of these flowers is determined by the presence of this six-segmented perianth, the three outer segments of which are a kind of calyx, the three inner forming a kind of corolla. By adhesion or absorption the parts of the perianth are sometimes reduced to five or three, and springing from its sides are the six stamens whose anthers contain pollen-grains. They are natives of all countries, but very cold and dry climates produce but few species; some of them grow in the ground, but a large number are epiphytes, growing upon trees; and it is above all in the great virgin forests of South America and of the East Indies that the orchids abound. The orchids attract much attention, and are cultivated with zeal on account



Butterfly orchid.

of the beauty or curious shapes of the flowers (which often assume the forms of reptiles, insects, and other denizens of the animal kingdom), or for their not infrequently fragrant smells. The nutritive substance called salep is prepared from the roots and tubers of several species; the fragrant vanilla is obtained from two species of a genus of that name.

ORCUS, a name among the Romans for Tartarus or the infernal regions.

ORDEAL, an ancient form of trial to determine guilt or innocence, practiced by the rude nations of Europe, in the East, and by the savage tribes of Africa. Fire-ordeal was performed either by taking in the hand a piece of red-hot iron, or by walking barefoot and blindfold over glowing coals or over nine



1, *Aganisia tricolor*. 2, *Coryanthes macrantha*. 3, *Miltonia Bluntii*. 4, *Nanodes Medusae*. 5, *Dendrobium Brymerianum*. 6, *Brassia caudata* var. *hieroglyphica*. 7, *Cattleya Trianae* var. *purpurata*. 8, *Masdevallia spectrum*. 9, *Laelia elegans* var. *Houtteana*. 10, *Coelogyne pandurata*. 11, *Taphinia Randi*.

ORCHIDS.

red-hot ploughshares laid lengthwise at unequal distances; and if the person escaped unhurt, he was adjudged innocent, otherwise he was condemned as guilty. Water-ordeal was performed either by plunging the bare arm to the elbow in boiling water, escape from injury being considered proof of innocence; or by casting the person suspected into a river or pond, and if he floated without an effort to swim it was an evidence of guilt, but if he sunk he was acquitted. Besides these ordeals there were a variety of others practiced in many countries, such as the corsned or hallowed morsel trial, the trial by touching the dead body of a person murdered, which was supposed to bleed if touched by the murderer, the ordeal by swallowing certain herbs and roots, etc. Ordeals are still found in many nations out of Europe, as in West Africa and other parts of that continent. In Madagascar till lately trial by ordeal (swallowing the poison of the tree *Tanghinia venenosa*) was in regular use. The Chinese still retain the ordeal of fire and water, and various ordeals are practiced among the Hindus.

OR'DERLIES, are privates and non-commissioned officers selected to attend upon general and other officers, for the purpose of bearing their orders and rendering other services. The orderly officers, or officer of the day, is the officer of a corps or regiment, whose duty is to superintend its interior economy, as cleanliness, quality of the food, etc. An orderly book is provided by the captain of each company or troop, in which the general or regimental orders are entered.

ORDER OF THE DAY, in parliamentary language, is a bill or other matter which is to be discussed on a particular day.

ORDERS, Holy, a term applied to the different ranks of ecclesiastics. The Anglican and other Reformed Episcopal churches recognize only the three orders of bishops, priests, and deacons. The Roman Catholic church admits of seven orders: four minor or secular—doorkeeper, exorcist, reader, and acolyte and three major—deacon, priest, and bishop. The Greek church has also the distinction of major and minor orders, but the functions of the four minor orders of the Roman Catholic church are united by the Greeks in the single order of reader. The term holy orders, or simply orders, is also used as equivalent to the clerical character or position as "to take orders," "to be in orders."

ORDERS, Military, fraternities or societies of men banded together in former times for military and partly for patriotic or Christian purposes. Free birth and an irreproachable life were the conditions of admission. The chief were the Templars, the Teutonic Knight and the order of St. John of Jerusalem.

ORDERS, Religious, are associations, the members of which bind themselves to lead strict and devotional lives, and to live separate from the world. Prior to their formation there were only the Hermits or Anchorites. (See Monastery.) The entry into religious orders from their foundation to the present time, is preceded by the taking of the

monastic vow, which enjoins residence in a monastery, celibacy, renunciation of worldly pleasures, the duty of prayer, fasting, and other austerities, and unconditional obedience to superiors. These conditions form the basis of the majority of orders, some being more austere in their observances than others. The first properly constituted religious order was founded in the 4th century by St. Basil. The Basilians are now chiefly confined to the Greek church in the East. In the time of Justinian (530) St. Benedict established a new order, the Benedictines, under a set of rules based principally on those of St. Basil, and for some 600 years after the greatest number of European monks followed his statutes. According to some authorities as many as 23 orders sprung from this one. About 1220 the Dominicans and Franciscans originated by taking amended rules from their leaders. In the 8th century the monks began to be viewed as members of the clerical order, and in the 10th, by receiving permission to assume the tonsure, they were formally declared clergymen. Indeed, public opinion and several papal bulls placed them, as superior in sanctity, above the secular clergy, who for this reason often became monks. As the secluded life of the monks, soon after the origin of monasteries, had given rise to similar associations of pious females, so nuns commonly banded together as new orders of monks arose, and formed societies under similar names and regulations. There were also congregations of nuns who united with certain orders of monks without adopting their names. The Ursuline and Hospitaller nuns, or Sisters of Mercy, are female orders existing independently of any male orders, and living according to the rules of St. Augustine. At the head of every religious order stands a general or governor, who is chosen every three years from the officers of the institution, resides at Rome, and is responsible only to the pope. The counsellors of the general are the officers to whom the supervision and government of monasteries is committed.

ORDERS OF ARCHITECTURE, the chief styles or varieties exhibited in the architecture of the Greeks and Romans. Technically the chief feature of the order is the column—including base, shaft and capital—and its superincumbent entablature (consisting of architrave, frieze, and cornice). The character of the order, however, is displayed not only in its column, but in its general forms and detail, of which the column is, as it were, the regulator. There are five classic orders, namely Grecian: Doric, Ionic, and Corinthian; Roman: Tuscan, and Roman or Composite. See Architecture, Columns, and the articles on the various orders.

ORDINANCE, in its broadest sense, any law or statute enacted or promulgated by a governmental authority, but more commonly used to designate laws or regulations passed by the governing bodies of municipalities. In the United States the term is almost exclusively applied to the laws or regulations passed by the common councils, boards of aldermen, or other governing bodies of municipalities. An ordinance

differs from a resolution, which is an expression of the will of any organized body, generally to carry out some ministerial act relating to its own internal management, or other matter not affecting the general public, as a resolution of respect in honor of a deceased person. The formalities for the enactment, publication, enforcement, and repeal of ordinances are largely regulated by statutes.

ORDINATION, the initiating of a Christian minister or priest into his office. The English Church considers ordination as a real consecration; the high-church party maintaining the dogma of the regular transmission of the episcopal office from the apostles down to the bishops of the present day. For ordination in the English church, subscription to the thirty-nine articles is requisite. The ceremony of ordination is performed by the bishop by the imposition of hands on the person to be ordained. In most Protestant countries with a state church, ordination is a requisite to preaching; but in some sects it is not held necessary. In the Presbyterian and Congregational churches ordination means the act of settling a licensed preacher over a congregation, or conferring on him general powers to officiate wherever he may be called.

ORDNANCE. See Cannon, Artillery, Howitzer, Mortar, etc.

ORDNANCE DEPARTMENT OF THE U. S. ARMY. Its duties consist in the establishment and maintenance of arsenals, armories, and depots for the manufacture and storage of ordnance. The regulations define ordnance and ordnance stores as including cannon and artillery carriages and equipments; apparatus and machines for the service and manoeuvre of artillery; small arms, ammunition, and accoutrements; horse equipments and harness for the artillery; tools, machinery, and materials for the ordnance service.

ORE, the compound of a metal and some other substance, as oxygen, sulphur, or carbon (forming oxides, sulphides, carbonates, etc.), by which its distinctive properties are disguised or lost. Metals found free from such combination and exhibiting their natural character are called native. Metals are commonly obtained from their ores by smelting, the ores having been previously oxidized by roasting. Ores are commonly found in veins or lodes. See Mining, and the articles on the different metals.

OR'EGON, one of the United States, on the Pacific coast, having on the north the Columbia river; east, the territory of Idaho; south, Nevada and California; and west, the North Pacific ocean; area, 96,030 sq. miles. It ranks seventh in size among the states. The 300 miles of coast-line are generally rugged and precipitous, and offer but few harbors. The interior consists of wide and elevated plateaux, rich in pastures and pine forests. Two great ranges divide the whole territory into three distinct portions. The first of these portions stretches north and south along the Pacific, and east from it for a width of 100 miles to 150 miles;

OREGON

and is then hemmed in by a lofty mountain-chain, which is called the Cascade Range, and occupies the whole breadth of the territory from s.s.w. to n.n.e. The other two portions, much more irregular in shape, are formed by a range which, under the names of the Blue mountains and the Klamath finally bends round to the southwest, and becomes linked to the Cascade range. The influence of topography on climate is very apparent in Oregon. The winds from the ocean are deprived of nearly all their moisture by the coast and Cascade ranges, which also bar out the tempering influence of the sea, so that the portion west of the Cascades has a moist and equable insular climate, while east of the mountains the climate is dry and continental, with great extremes. In the west the rainfall is abundant, and in some places excessive. On the eastern plateau it is insufficient for the needs of agriculture. Salmon fishing and canning is one of the most important industries, and is unequalled by any other state. Sturgeon, halibut, oysters, and other varieties of fish are caught in less quantities.

The different sections of the state, varying so distinctly in climate, topography, and soil, naturally vary in agricultural development. The two leading crops are wheat and hay. The area devoted to wheat doubled between 1880 and 1900. During the same period the acreage of hay and forage gained over threefold. Oats are grown principally in the Willamette valley, and barley in the northeast counties. Oats have a large acreage. Potatoes produce abundantly and are an important crop. Sugar beets are also raised. The state ranks second in the production of hops, their culture being confined principally to the Willamette valley. The region between the Cascade and Coast ranges, particularly Jackson and Douglas counties, has become noted for the production of fruit. Though the quantity of arable land is comparatively small, the pastures are large and rich; the forests abound with pines of almost unrivalled magnificence, and the metalliferous fields which have made California so famous are traced into Oregon. Gold is the only mineral extensively mined. It is produced chiefly in the Blue mountain region in the northeastern part of the state. Other minerals found are chrome iron, limonite or brown hematite iron ore, copper, magnetite nickel, mercury, platinum, iridium, lead and antimony, as well as clay, salt, and alkali deposits. Small quantities of silver, borax, and coal are mined. Horses, cattle, swine, and sheep are raised in great numbers. Large sections of the state are fit only for grazing. The natural grasses cure on the ground and supply nutritive pasturage all the year. The Pacific ocean, the Columbia river, and Snake river provide three sides of the state with the advantages of water communication. Along the coast are nine inlets which offer harbor facilities. Large ocean going vessels pass up the Columbia as far as Portland. The construction of a canal at Cascade Locks allows river steamers to go as far as The Dalles, above which point it is again

navigable. The Snake river is navigable beyond the point where it leaves the boundary. The Union Pacific and the Southern Pacific own the greater portion of the total mileage which is very low, being only about 1700 miles. The chief exports consist largely of wheat and lumber products. Salem is the capital. Portland is the largest city in the state.

The accounts of the early exploration of the western Pacific coast are conflicting and unreliable. The Spanish explorer Ferrello possibly reached the southern boundary of Oregon in 1543, and Sir Francis Drake touched here in 1570. The English navigator, Captain Cook in 1778 landed at Nootka Sound,



Seal of Oregon.

which he so named. In 1805-06 Lewis and Clark explored much of the country. The northwestern boundary between the United States and Canada was fixed by the convention of 1818 as the line of 49° from the Lake of the Woods to the Rocky Mountains. The Oregon question claimed the attention of congress after 1820, and the sentiment for demanding "all of Oregon" grew. By the negotiations with Russia (1824-25) that country agreed to make no settlement south of 54° 40', and the idea gained ground that this was the proper northern boundary. The settlement of the northeastern boundary had been unsatisfactory, and in 1844 a popular rallying cry of the democrats was "Fifty-four forty, or fight." It was finally agreed in 1846 that the boundary should be 49° to the channel between Vancouver and the mainland, thence down the middle of this channel, through the Straits of San Juan de Fuca to the sea. Oregon territory, including the present Washington and much of Idaho, was organized on August 14, 1848. The state was admitted February 14, 1859, with the present boundaries. The state has given its electoral vote for the republican ticket except in 1868, and one vote in 1892, though usually by small majorities. In 1892 the democrats indorsed one populist elector, and the vote that year was: republican, 3; populist, 1. Pop. 1909 about 650,000.

OREGON, University of, a coeducational State institution at Eugene, Ore., founded in 1872 and opened in 1876. It comprises the university academy; the college of literature, science, and the arts, with a school of commerce, and

courses in law, journalism, and teaching; the college of science and engineering, with courses preparatory to medicine and dentistry; the school of music; the graduate school; and the schools of law and medicine, the last two at Portland.

OREGON QUESTION, in American history the dispute between the United States and Great Britain over the delimitation of their possessions on the Northwest coast, leading to the determination of the present boundary.

OREGON RIVER, a river in North America. See Columbia River.

OREL, a central government of Russia, south of the Tula and Kaluga; area, 18,042 sq. miles. Its trade in grain, dairy produce, and cattle with Moscow and St. Petersburg is very extensive. Manufactures are also increasing, and the town is making rapid progress. Pop. 78,091. Pop. of government, 1,963,706.

O'RENBURG, a government of Eastern Russia, partly in Europe, and partly in Asia, with an area of 73,816 sq. miles; pop. 1,609,388. The capital, Orenburg, on a slope above the right bank of the Ural, has, besides vast tallow-melting establishments, woolen, soap, and leather factories, and a large caravan trade with Khiva and Bokhara. Pop. 72,740.

OREN'SE, a city of N. W. Spain, Galicia, capital of the province of same name, and see of a bishop, on the left banks of the Minho, here crossed by an old and remarkable bridge, built in 1230. Pop. 15,250.—The province has an area of 2739 sq. miles, and a population of 404,311.

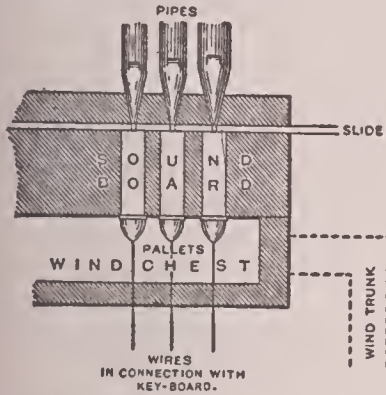
ORES'TES, in Greek mythology, the son of Agamemnon and of Clytemnestra the avenger of his father, by becoming the murderer of his mother. For this murder he is relentlessly pursued by the Eumenides or Furies, and only succeeds in appeasing these terrible goddesses by carrying out the instructions of the Delphian oracle to bring back the statue of Diana from Tauris to Argos. Married to Hermione, daughter of Menelaus, Orestes ruled over his paternal kingdom of Mycenæ, and over Argos, upon the death of its king. Orestes is an important figure in the Choëphori and the Eumenides of Æschylus, the Electra of Sophocles, and the Orestes and Iphigenia in Tauris of Euripides.

ORGAN, a wind-instrument of music, the grandest of musical instruments, the introduction of which into the church service has undoubtedly exercised a powerful influence on the development of musical art. It is stated to be very ancient origin, but is most probably the offspring of the hydraulic water organ of the Greeks. The early organs were very imperfect instruments, but improvements were naturally made from time to time, the most notable being those of the 16th century, when the bellows were much improved and the division of all the pipes into different stops invented, and the tone of the instrument adapted to the church. The invention of the wind-chest in the 17th century, by which an equal pressure of wind can be obtained from the bellows, led chiefly to the present

ORGAN

ORIGINAL SIN

perfect state of the organ. The three essentials of an organ are: (1) a chest of compressed air; (2) a set of pipes producing musical sounds in communication with this chest; and (3) a keyboard or clavier, by means of which this communication may be opened or closed at pleasure. The air is forced into the wind-chest by means of bellows. To the upper part of each wind-chest is attached a sound-board, a contrivance for conveying the wind to any particular



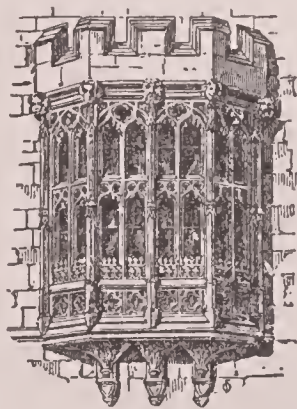
Organ—internal arrangements.

pipe or pipes at pleasure, and divided into as many grooves as there are keys. Air is admitted into these grooves by means of valves or pallets, which are connected with the keys; the transmission of air being regulated by the register or slide. The series of pipes above each slider is called a stop. The principal stops of an organ are the open, stopped, and double diapasons; the principal, dulciana, twelfth, fifteenth, flute, trumpet, clarion, bassoon, crenona, oboe, and vox humana. An organ may have several wind-chests filled by the same bellows, and several key-boards, each key-board and wind-chest representing a distinct organ. In the largest instruments the number of these organs generally amounts to five; viz.: the great organ, the choir organ, the swell organ, the solo organ, and the pedal organ. The key-boards for the hand are termed manuals, that for the feet the pedal. The most usual compass of the manuals is from CC to F in alt, four octaves and a half; that of the pedal from CCC to E or F, two and a quarter to two and a half octaves. There are two kinds of organ-pipes—flute pipes or mouth pipes, and reed pipes, of each of which there are several species, the character and quality of their sound depending mainly on the material employed in their manufacture (wood or metal), their shape, and dimensions. A hydraulic engine has been adapted, with success, to the purposes of working the bellows, and it is now pretty generally adopted. In 1863 a contrivance was patented for transferring some of the work from mechanism to electro-magnetism. An organ built on this principle is termed an electric organ. The principal advantages of this description of organ are that it facilitates the playing, and enables the organist to sit at a key-board at a distance from the instrument. Among the largest organs are those in St. Peter's in Rome, the Seville Cathedral, of Weingarten in Suabia, of Haarlem, and of Notre

Dame, Paris. The largest organ ever constructed is that built in 1870 for the Royal Albert Hall, London. There are five rows of keys for the choir, great, swell, solo, and pedal organs; 138 stops nearly 10,000 pipes. The bellows are inflated by steam power. A free-reed instrument was introduced about 1860 by Mason and Hamlin of New York, known as the American organ, differing from the harmonium in having smaller and more curved reeds and in drawing the air inward. It is more easily blown than the harmonium, and its tones are of a more organ-like quality, but it is inferior to the latter instrument in variety of tone and power of expression.

ORGAN, Organization. In biology, the term organ is applied to all the definite parts with special functions, forming as a whole the structure of a living body, whether animal or vegetable. The dissimilarity between the organs of which a living being is composed forms a very striking contrast to the structure of lifeless bodies. A lifeless body—such as a mineral—exhibits generally a sameness or homogeneity of structure. Its intimate parts or particles are usually of a similar kind or nature. Hence this broad and patent distinction has resulted in the employment of the terms organic and organized to express the characteristics of living beings; while to the lifeless part of creation the opposing term inorganic is applied. Organization thus means the possession of definite organs, structures, or parts, which have definite relations to each other; and an organism is a whole, an animal or plant, possessing such organs.

ORIEL WINDOW, a window projecting from the outer face of a wall, in plan semi-hexagonal, semi-octagonal, or rectangular, thus having three or more sides, divided by mullions and



Oriel window, Balliol college, Oxford.

transoms into different bays and other projections, and supported by brackets or corbels. A projecting window rising from the ground is sometimes called an oriel, but is more properly a bay-window.

ORIENTAL LANGUAGES, the general designation at the present day for the languages of the nations of Asia, as also of the Mohammedan countries of Europe and Africa.

ORIFLAMME, until Charles VII.'s reign, the royal standard of France originally the banner of the abbey of

St. Denis and its lord protector. When the French kings chose St. Denis as their patron saint, they made the oriflamme the principal banner of their armies. It was a piece of red taffeta fixed on a golden spear, in the form of a banner, and cut into three points, each of which was adorned with a tassel of green silk.

ORIGEN (or'i-jen), Origenes, surnamed Adamantios, one of the greatest and most influential of the Greek fathers born at Alexandria, A.D. 185, died at Tyre 254. He lectured with much success in Alexandria, and gained the patronage of Bishop Demetrius. His studies were pursued with extraordinary zeal; he lived an ascetic life, and in order to be free from the lusts of the flesh he mutilated himself. A journey to Rome (211–212) greatly increased his reputation. In 228 he went to Palestine; he was so well received, and so many favors were bestowed on him, that his patron became jealous, recalled him to Alexandria, and finally deprived him of his priestly office, charged him with heresy, and expelled him from the city. These persecutions never ceased until the death of Demetrius in 231. In a new persecution, under the Emperor Decius, Origen, who was viewed as a pillar of the church, was thrown into prison, and subjected to the most cruel sufferings, ultimately resulting in his death. He is credited with some 6000 works, including smaller tracts, but only a few have been transmitted to us, and some of these only in a distorted form. His work against Celsus is considered as the most complete and convincing defense of Christianity of which antiquity can boast.

ORIGINAL SIN, in theology, the first sin of Adam, namely, the eating of the forbidden fruit; hence, either the imputation of Adam's sin to his posterity, or that corruption of nature and tendency to sin inherited from him. The Greek fathers held that a perverted will and sin are co-ordinate with the human race, and that death has dominion over it by reason of its origination from Adam after the fall. In the Latin church the doctrine was more fully developed than in the Greek church. Tertullian, in accordance with his doctrine of Traducianism, which holds that the soul as well as the body is generated by the parents, asserted that sin and death were alike propagated from Adam; he accordingly held an originis vitium, but without regarding it as actual sin or denying to man the possibility of goodness. Pelagius held that no change whatever had been brought about by the fall, that death was a part of man's original constitution, and that all men could render faultless obedience to the law of God, if they wished. Augustine succeeded in getting this doctrine condemned in favor of his own, which inculcated that "Death was brought into the world by Adam's sin; man's free-will, the reflex of the divine will, was lost to him by the fall as regards good; there remained only spontaneity, the negative of outward constraint, and free-will as regards evil." Pelagianism, however, sprung up again in a modified form, called semi-Pelagianism, and

according to this view death and a taint of corruption were inherited from Adam as a disease might be, but man still retained a power for good without the aid of divine grace; a doctrine which obtained much support in the church. The reformers of the 16th century upheld the Augustinian view of original sin, though by no means unanimously, in opposition to the Roman Catholics, who at the council of Trent gave their adhesion to the semi-Pelagian view of the doctrine. In recent times orthodox theologians, such as Olshausen, Hengstenberg, and others, have stood up for the Augustinian doctrine, while those of the more liberal school have modified it in various ways. Philosophers as well as theologians have taken part in this controversy about original sin.

ORIGIN OF SPECIES. See Species.

ORINO'CO, a river of South America, one of the largest in the world, its principal mouth being 6 leagues wide; length about 1500 miles. The scenery on its banks is magnificent beyond description. Two remarkable rapids occur in the upper part of the Orinoco, and from these the river is navigable to its mouth (about 780 miles).

O'RIOLE, a name popularly applied to two groups of birds. The American orioles are nearly allied to the starlings. The Baltimore oriole, or golden robin, is a familiar species of this group. Another, the orchard oriole is distributed very generally over the United States. The orioles proper, or those of the Old



Baltimore oriole.

World are nearly related to the thrushes. They are found in Asia, Africa, the islands of the Indian Archipelago, and Southern and Eastern Europe. The golden oriole is the typical form, and the only European member of the group. The wings and tail of the males are black, and contrast powerfully with the golden color of the body. In size it resembles a common thrush or blackbird. It chiefly inhabits Southern Europe, but is occasionally found in Britain. The song is loud, and resembles the sound of the flute.

ORI'ON, a hero of Greek mythology. According to Homer he was a beautiful youth, of whose charms Eōs (Aurora) became enamored. The gods were jealous of her love, and Artemis slew him with her arrows. According to other writers he was a great hunter of colossal stature, and died of the sting of a scorpion. The hero after his death was placed with his hounds in the heavens as a constellation, which bears his name.

ORI'ON, a constellation situated in the southern hemisphere with respect to the ecliptic, but the equinoctial passes nearly across its middle. This constellation is represented by the figure of a man with a sword by his side. It contains seven stars, which are very conspicuous to the naked eye; four of these form a square, and the three others are situated in the middle of it in a straight line, forming what is called the Belt of Orion. Orion also contains a remarkable nebula, and thousands of stars which are only visible through powerful telescopes.

ORIS'SA, a maritime province of Hindustan, lying on the Bay of Bengal, between Bardwan and the Madras Presidency, forming a division or commissionership under the jurisdiction of the Lieut.-governor of Bengal. It has an area of 9853 sq. miles, and includes the districts of Balasore, Cattack, Puri, the Angul and Khand Mehals, besides tributary states. Pop. 4,350,372.

ORKNEY ISLANDS, a group lying off the northern coast of Scotland, and separated from it by a channel called the Pentland Firth, about 6 to 8 miles broad; aggregate area, 375 sq. miles. There are 67 islands and islets, 28 of which are inhabited. James III. of Scotland received the islands as a dowry with Margaret of Norway in 1469, and ever since they have belonged to Scotland. Pop. 28,699.

ORLEANS (or-lā-ān), a city of France, formerly capital of Orléanais, now of the department of the Loiret, situated on the right bank of the Loire, 68 miles southwest of Paris. In 1428 the city sustained a siege against the English, and was relieved by the Maid of Orléans (see Joan of Arc), whose statue in bronze stands in one of the public squares. It was taken and retaken more than once in the Franco-German war in the latter part of 1870. Pop. 67,539.

ORLEANS, a French royal family, two houses of which have occupied the throne of France. (1) On the death of Charles VIII. without issue in 1498, Louis, duke of Orléans, great-grandson of their common ancestor Charles V., and grandson of the first Duke of Orleans, being the nearest heir, ascended the throne under the title of Louis XII. Henry III. (died 1589) was the last sovereign of this house, or the Valois-Orléans branch. (2) The house of Bourbon-Orléans is descended from Philip, duke of Orléans, son of Louis XIII. and younger brother of Louis XIV. His son Philip, duke of Orléans, was regent of France during the minority of Louis XV. His grandson Louis-Philippe Joseph, who assumed the surname of Egalité, was beheaded in 1793. Louis Philippe, duke of Chartres, afterward king of the French, was the son of Egalité. The grandson of Louis-Philippe the Comte de Paris (1838-94), became head of the royal house and royalist party, leaving a son, the Duke of Orleans, to inherit his claims. See Bourbon and Paris, Comte de.

ORLEANS, Jean Baptiste Gaston, Duke of, third son of Henry IV. of France, and Mary of Medici, born 1608, died at Blois 1660. By his first marriage, with Mary of Bourbon, heiress of the

house of Montpensier, he had a daughter, the author of some interesting memoirs. During the disturbances of the Fronde he joined De Retz, the soul of the Fronde, who, however, soon saw through the character of his fickle and feeble confederate. After the termination of the troubles (1648) the duke was banished to Blois.

ORLEANS, Louis Philippe Joseph Duke of (Egalité), great-grandson of the regent, Philippe, duke of Orléans, was born in 1747; married in 1769 the daughter of the Duke of Penthièvre. In 1787 he was exiled for the part he took in the Assembly of Notables; in 1789 he was one of the nobles who joined the Tiers Etat (Third Estate); in 1792 he went over to the revolutionary party without reserve, took the name of Philippe Egalité ("Philip Equality"), and voted for the death of Louis XVI. It did not save him from being arrested as a Bourbon, condemned and beheaded, 6th November, 1793.

ORLEANS, Maid of. See Joan of Arc.

ORLEANS, New. See New Orleans.

ORLEANS, Philippe, Duke of, only brother of Louis XIV. of France, and founder of the house of Bourbon-Orléans, which for a short time held the throne of France, was born in 1640, died 1701. In his twenty-first year he married Henrietta of England, sister of Charles II. The second marriage of the duke, with the Princess Elizabeth of the Palatinate (1671), was arranged by Louis to secure the neutrality of the Elector Palatine in the approaching war against Holland. In this war the duke distinguished himself in spite of his effeminacy.

ORLEANS, Philippe, Duke of, Regent of France, son of Philippe, Duke of Orleans and the Princess Palatine Elizabeth, born 1674, died 1723. He made his military début at the siege of Mons (1691), and in 1693 distinguished himself at Neerwinden, but only to arouse the jealousy of Louis XIV., his uncle, who compelled him to retire from the army. In 1692 he married Mdlle. de Blois, the legitimated daughter of Louis. In 1707 he was appointed to succeed the Duke of Berwick in Spain, and completed the subjugation of that country. On the death of the king (1st September, 1715) he was appointed regent. He resigned the government to Louis XV. on 13th February 1723.

ORNE, a department in Normandy, France; area, 2354 sq. miles. It manufactures needles, pins, wire, porcelain cotton and linen cloths, and has valuable granite quarries. Alençon is the capital. Pop. 367,248.

ORNITHOL'OGY, that branch of zoology which treats of birds. Birds form the second class of the great division of vertebrate animals, the connecting link between the Mammalia and Reptilia, but are more closely allied to the latter. In common with the Mammalia they have warm blood, though of a higher and uniform temperature (8°-12° higher), a heart with two auricles and two ventricles, and breathe by lungs; but differ from them in having feathers for a covering, and feet, wings, by means of which most of

them are enabled to fly, a horny bill, and reproduction by eggs. The feathers, the development of which resembles essentially that of hair, constitute appendages of a unique kind, as being developed only in connection with the bird-class. The under-plumage of most birds is formed by a thick coating of small shaftless feathers, embedded in the skin and called down. Various names are given to feathers according to their position; thus the long quills on the part of the wing corresponding to the hand are called primaries, those on the lower fore-arm secondaries, and those on the upper part of the fore-arm tertiaries, those on the shoulder-blade and humerus scapulars. The feathers covering the bases of the wing-quills are called wing-coverts, and those covering

is very large, and the sense of hearing very quick.

The bone-tissue of birds is light and compact. The bones are whiter and contain a larger proportion of phosphate of lime than those of the mammalia and lower vertebrates. The bones of most birds are pneumatic, that is, contain air instead of marrow, to adapt them for flight; the air being admitted by means of special apertures which are connected with certain sacs, termed air-cells, filled with air from the lungs. In many birds, however, the long bones are filled with marrow, as are also all the bones of young birds. The humeri, cranial bones, and sternum are most generally pneumatic, the femora more rarely so. The vertebræ vary considerably in number in different species. The neck is always more or less elongated and flexible, and consists of from 9 to 23 vertebræ. The dorsal region, or region of the back, is composed of from 4 to 9 vertebræ, and is generally firm, forming a support for the movements of the wings. In all birds the neck is of sufficient length to reach the oil-gland situated at the tail, the secretion of which is used for "preening" or dressing the feathers. The vertebræ interposed between the dorsal vertebræ and those of the tail are united to form the sacrum, the number of vertebræ which may thus coalesce varying from 9 to 20. The caudal or tail vertebræ may number ten, the last two or more of which unite to form a bone, called from its shape "plough-share" bone. In some species this bone is absent, undeveloped, or modified. The bones of the skull become firmly united at an early period, so as to leave few or no sutures or lines of union, as in mammals, a complete bony case being thus formed. The skull is joined, as in reptiles, to the spinal column by a single process, or condyle, of the occipital bone, or hindmost bone of the skull. The chest or thorax is inclosed posteriorly by the dorsal vertebræ, laterally by the ribs, and in front by the sternum or breast-bone and the sternal ribs. The ribs correspond in number with the dorsal vertebræ, from 6 to 9 pairs of ribs being thus found in birds, the first two being generally unattached, that is, they do not reach the sternum in front. The sternum is large and strong, and serves as the point of attachment for the most powerful of the muscles by which the wings are set in motion. It is provided with a medial crest or keel, which is most prominent in the birds of most powerful flight, and is altogether absent in the ostrich and cassowary, birds which do not fly. Upon the upper or anterior portion of the sternum the coracoid bones are borne, which form the chief supports of the fore-limbs. At its upper portion each coracoid bone articulates with the scapula or shoulder-blade, and with one of the clavicles. The clavicles or collar-bones are united in most birds to form the furculum or merry-thought. The wing of the bird exhibits the essential skeletal elements found in the fore-limb of all other vertebrates. The humerus, or bone of the upper arm, is generally short; the forearm, composed of the radius and ulna, being the longest

segment of the fore-limb. The ulna is larger and better developed than the radius, which is slender and attenuated. In the bones which form the extremity of the wing we recognize the rudiments of a thumb and two fingers, one of which has two phalanges and the other only one. The femur or thigh is short, the tibia or shin-bone forming the chief element in the leg; while the fibula is attenuated and generally ossified to the tibia. The toes generally number four; the hallux or great-toe, when present, being composed of two phalanges, and the other toes of three, four, and five phalanges respectively. The muscles



Plumage of bird—Bohemian chatterer.

a, primaries; b, secondaries; c, coverts; d, scapulars; e, tail feathers; f, forehead; g, snipe; h, occiput.

the rectrices, or great feathers of the tail, tail-coverts. Birds moult or renew their feathers periodically, and in many cases the winter plumage displays a different coloring from the summer plumage. The plumage in most cases is changed frequently before it attains its characteristic and full-grown state. The mouth of birds takes the form of a beak or bill; the jaws or mandibles are hard and horny, and more or less prolonged into a point, while there are no fleshy lips, and no teeth (except in certain fossil birds); a horny sheathing generally smooth, but sometimes serrated, takes the place of the latter. The beak is variously modified in accordance with the habits of the bird and the nature of the food on which it subsists. The sense of taste is not keen, their tongue being generally slender, pointed, and more or less horny, though some birds, as the parrots, have it fleshy. The nostrils open upon the side, or at the base of the beak. Their sense of smell is often very delicate. A circle of naked skin called the cere in many birds surrounds the base of the mandibles. The sight of birds is extremely keen, and equally adapted for near and distant objects. A peculiar feature of the eye is the nictitating membrane, a sort of third translucent eyelid which rests in the inner angle of the eye, but can be drawn over it so as to protect it from too strong a light. Birds have no external ear, with the exception of the nocturnal tribes; these have a large anterior conch in the form of a thin leathery piece of flesh. The internal ear



Skeleton of Egyptian vulture to show bones of bird.

a, post-orbital process; b, lower jaw; c, cervical vertebræ; co, coracoid bone; d, humerus; e, radius; f, ulna; g, metacarpus; h, second phalanx of chief digit of wing; h', phalanges of lower digit; h'', first phalanx of chief digit; i, clavicle; k, sternum; l, pelvis; m, coccyx; n, femur; o, tibia; p, tarso-metatarsus; q, phalanges of foot.

of birds are firm and dense, and are generally colored deep red. The chief body-muscles are the pectorals, or those of the breast, which are devoted to the movements of the wings.

There are three stomachs or stomachic dilatations in birds; the first is the crop, a considerable pouch attached to the œsophagus or gullet; then the ventriculus succenturiatus, a slight dilatation of the œsophagus, with thick and glandular walls; then immediately after this is the gizzard, a strong and muscular cavity. In granivorous birds the crop is large, and serves as a reservoir for the seeds swallowed by them, which are here moistened by a secretion before passing into the gizzard. In these birds the gizzard is extremely strong, having to perform the task of grinding down the hard substances subjected to its action, a process which is facilitated by the small stones which these birds generally swallow. The ventriculus secretes the gastric juice, and so far represents a real stomach. In birds which live on flesh or fish the gizzard is weaker and less distinct from the ventriculus; while the crop becomes smaller, and in some species completely disappears. The intestinal canal is relative-

ly smaller than in mammalia and presents fewer circumvolutions. It terminates in an opening called the cloaca, which is also the common termination of the ureters and oviduct. The liver is generally large, and colored a distinct brownish hue, which is deepest in aquatic birds. A gall-bladder is absent in a few cases only, as in the ostrich, pigeons, and some parrots. The kidneys are two in number, of large size and



Digestive system of common fowl.

a, gullet; b, proventriculus; c, gizzard; d, duodenum; e, caecal appendages; f, large intestine; g, cloaca; h, small intestines; i, liver; k, crop.

elongated shape. The urine consists in greater part of earthy matters, and contains but a small proportion of water, hence its whitish appearance. The spleen is usually of small size, rounded or oval, but may also be elongated or broad and flattened. The heart is highly muscular, four-chambered; the blood, deep-red in color, circulates rapidly and vigorously. The lungs are confined to the back portion of the body, and are attached to the ribs instead of being free, as in mammalia. They are not divided into lobes, and are usually of a bright-red color. They are enveloped in a membrane pierced with large holes, which permit the air to pass into the cavities in the breast and in the abdomen, and, in some species, even into the interior of the bones. The trachea or windpipe is of great relative length in birds, and is adapted to the length of the neck. The nervous system evinces a marked superiority over that of reptiles. The cerebrum, or true brain, is larger than in the latter, but its surface is not convoluted, as in most mammalia. The generative organs consist of the essential organs or testes of the male, accompanied in some cases by an intromittent organ. The female organs consist of an ovary and oviduct. The eggs are hatched by the process of incubation. Very great differences exist in the size, form, and number of eggs which may be produced by birds, and in the time required for their hatching. The varieties of nests in which they are deposited, as to mode and materials used in construction, are endless.

Many birds migrate at certain seasons from one country to another, and a re-

cent report on migration shows, that with very few exceptions there is scarcely a bird of either the palæarctic or nearctic regions that is not, to a greater or less degree, migratory in some part or other of its range. See Migration.

Birds are not numerous as fossil organisms. Among the most important and interesting bird fossils we at present possess are the two specimens of archæopteryx found in the slate-quarries of Solenhofen (Bavaria). This bird differed from all existing birds in the elongated reptilian nature of its tail, which was composed of simple vertebræ, each bearing a single pair of quill-feathers. It had also teeth. They certainly tend to prove the evolution of birds from reptiles. Other two most interesting fossil birds are the ichthyornis and the hesperornis, both found in the cretaceous formations of North America and both provided with teeth; but while the former must have had powerful wings the latter was quite wingless.

ORNITHORHYNCHUS, the duck-billed water-mole of Australia. With the echidna or porcupine ant-eater of Australia it forms the order Monotremata—the lowest division of the mammalian class. This curious animal was first described by Shaw in 1792, and caused no little excitement among zoologists. It presents a quadruped, of the shape and size of a small otter, covered with short brown fur; a horny flat bill like a duck; a short flat tail; short legs with five-toed and webbed feet, terminated by claws. The eyes are small; external ear wholly wanting. The skull is bird-like in conformation; brain without convolutions; coracoid bones as in birds well developed. Its young are produced from eggs, are born blind and



Ornithorhynchus or water-mole.

hairless, and suckled from milk-glands destitute of nipples. It forms large burrows in river and lake banks, rising from near the surface of the water to a height of perhaps twenty feet above it, the nest being at the higher end. It swims for its food, which consists of insects, worms, larvæ, etc.

ORPHAN ASYLUM, or **ORPHANAGE**, an establishment in which orphans are provided for and educated. In all well-regulated states the duty of taking care of destitute orphans was recognized at an early age, and it appears that the cities of Thebes, Athens, and Rome had establishments in which orphaned, deserted, and illegitimate children were supported and educated at the public expense. In the laws of Emperor Justinian there is frequent mention of such

institutions. In the middle ages such asylums were numerous and generally under the direction of the clergy. In recent times public orphanages have been substituted or supplemented by the farming-out system, that is, the children are brought up in private families willing to undertake their charge. This system, with due care in the selection of guardians and judicious supervision, has proved satisfactory wherever it has been tried. It is more economical, and the example of respectable family life cannot fail to have a beneficial moral influence, which is absent in the public establishments.

ORPHEUS (or'fūs), a personage of great importance in the mythology of Greece, surrounded by a multitude of legends, which invariably associate him with Apollo and the Muses. To him is attributed the application of music to the worship of the gods. Apollo presented him with his lyre, and the Muses instructed him to use it, so that he moved not the beasts only, but the woods and rocks with its melody. Having lost his wife Eurydice by the bite of a serpent he descended to Hades to try and get her back. His music so moved the infernal deities Pluto and Proserpine that they consented to her return to earth, only her husband, whom she was to follow, must not look back till they had reached the upper world. This condition the impatient Orpheus violated and lost his wife forever. He is said to have met his death at the hands of a band of furious women engaged in the mystic rites of Bacchus. He is represented as one of the Argonauts, and to him is ascribed the origin of the so-called Orphic mysteries, connected with the worship of Bacchus. A considerable literature was connected with the name of Orpheus, the oldest portions of which were not earlier than 530 B.C. In part it yet exists, there being still extant a mythological poem called Argonautica, certain hymns, etc.

ORRIS ROOT, or **IRIS ROOT**, the root of several species of Iris. One species, on account of its violet-like smell, is employed in perfumery and in the manufacture of tooth-powder. It is also used in pharmacy as a pectoral.

ORSINI, one of the most illustrious and powerful families in Italy. It became known about the 11th century, and had already acquired high rank and extensive possessions in the papal states when one of its members, Giovanni Gaetano, was raised to the pontificate under the title of Nicholas III. (1277-80). The feud between the Orsini and Colonna families is celebrated in history; it commenced toward the close of the 13th century, and is distinguished for bitterness, unscrupulousness, and violence, assassination being not unfrequently resorted to. Many of the Orsini became famous military chiefs. Vincenzo Marco Orsini (Benedict XIII.) succeeded Innocent XIII. as pope in 1724. The Orsini family is now divided into two branches, the Orsini-Gravina at Rome and the Orsini of Piedmont.

ORSTED, or **OERSTED** (eur'sted), Hans Christian, Danish physicist, born in 1777, died at Copenhagen 1851. His fame first became diffused over the

scientific world in 1819 by the discovery of the fundamental principles of electromagnetism. In 1829 he became director of the Polytechnic School of Copenhagen, and on the occasion of his jubilee festival in 1850 he was created a privy-councillor.

ORTHODOX, the opposite of heterodox (which see), generally applied to what is regarded as the established opinion, or that which is commonly considered as right. The term is chiefly used in religious controversies to designate certain religious faiths or doctrines.

ORTHO'EPIY, that branch of grammatical knowledge which deals with correct pronunciation.

ORTHOGRAPHY, that part of grammar which treats of the nature and properties of letters, and their proper application in writing words, making one of the four main divisions or branches of grammar.

ORTHOPÆ'DIA, a branch of medical science relating to the cure of natural deformities. Hippocrates already occupied himself with the correction of deformed bones, but it was not until a comparatively recent epoch that this important subject met with the serious attention it deserves. Several institutions for the cure of bodily malformations were founded in France and Germany in the early part of this century. Orthopædia is divided into prophylactic or preventive, and therapeutic or curative. The object of the former is to prevent deformities in infants, and is obtained by hygienic means, such as pure air, careful nursing, and suitable food, clothing, and exercise; that of the latter to correct deformities already existing by mechanical treatment, which is most successful when resorted to as soon as any deviation from natural shape manifests itself. In our time the manufacture of orthopædic apparatus has become highly developed, and forms an important branch of trade.

ORTHOPTERA, an order of insects in which the metamorphosis is incomplete. They have four wings, the anterior pair being semicoriaceous or leathery, usually with numerous nervures, the wings sometimes overlapping and sometimes meeting like the roof of a house. The feelers are generally straight, filiform organs. The limbs vary in conformation according to their methods of movement. In their metamorphosis the larvæ and pupæ are both active, and the pupæ generally resembles the perfect insect, the wings being undeveloped. These insects are divided into Running and Leaping Orthoptera. Of the former division the coachroaches, earwigs, mantis insects, walking-stick insects, and walking leaves form the chief families. The Saltatoria are represented by the locusts, some of which want wings entirely, crickets, and grasshoppers. See also Entomology.

ORTOLAN, a bird of the bunting family, a native of Northern Africa and Southern Europe. The colors are yellow on the throat and around the eyes, the breast and belly being of reddish hue, while the upper part of the body is brown varied with black. Its delicate flesh is much esteemed by epicures,

and large quantities are annually caught and fattened for the table in the south of France, Italy, and Cyprus.



Ortolan.

OSAGE, a river in the United States, which rises in Kansas, flows through Missouri, and after a winding course of 500 miles joins the Missouri 10 miles below Jefferson City. The river gave name to an Indian tribe, the remnant of which now inhabit the Indian territory.

OSAGE ORANGE, a tree of the nat. order Moraceæ (mulberry), indigenous to North America, where it is frequently used as a hedge-plant. It produces a large yellow fruit of a woody texture, somewhat resembling an orange, but not edible.

OSA'KA, or **OHOSA'KA**, the second city and a free port of Japan, in the island of Hondo, on the estuary of the Yodo Gawa, 28 miles s.s.w. of Kioto. Pop. 821,235.

OSCAR I., Joseph François Bernadotte, King of Sweden and Norway, son of Bernadotte (Charles XIV.), born at Paris in 1799, died 1859. In 1823 he married Joséphine, eldest daughter of Prince Eugène Beauharnais. During the reign of his father he was three times (in 1824, 1828, and 1833) viceroy of Norway, where he made himself popular by his good administration. He acceded to the throne in 1844; reformed the civil and military administration of the state; abolished primogeniture; established complete liberty of conscience; encouraged education and agriculture; promoted railways, telegraphs, etc. He took little part in foreign politics. He resigned in favor of his eldest son in 1857.

OSCAR II., King of Sweden and Norway, born 1829; succeeded his brother, Charles XV., in 1872. In 1905 the union of Sweden and Norway was dissolved, since which time Oscar has been King of Sweden only. He is a writer of some merit; has translated Goethe's Faust into Swedish, and published a volume of poems under the pen-name of Oscar Frederik. He died in 1907.

OSCILLATION, the act of swinging to and fro. The term is often indiscriminately applied to all sorts of forward and backward motions, but it has special reference to the movements of the pendulum, which are subject to well-established laws. See Pendulum.

OSHKOSH, the capital of Winnebago co., Wisconsin, on Lake Winnebago, at the mouth of the Fox river. It has numerous saw and shingle mills, sash, door, and window factories, with other industrial establishments. Pop. 33,190.

OSIRIS, one of the great Egyptian divinities. He was the brother and

husband of Isis, and the father of Horus. He is styled the Manifestor of Good, Lord of Lords, King of the Gods, etc. In the Egyptian theogony he represented the sum of beneficent agencies, as Set of evil agencies. Osiris, after having established good laws and institutions throughout Egypt, fell a prey to the intrigues of his brother Set, the Typhon of the Greeks. He became afterward the judge of the dead. There are a multitude of traditions, both Greek and Egyptian, about Osiris. He is represented under many different forms, and compared sometimes to the sun and sometimes to the Nile. His soul was supposed to animate the sacred bull Apis, and thus to be continually present among men. The worship of Osiris ex-



Osiris.

tended over Asia Minor, Greece, and Rome, but the attacks of the philosophers and the rise of Christianity put an end to it.

OSKALOOSA (ös'ká-lōō'sá), the county seat of Mahaska co., Ia., 60 miles southeast of Des Moines. Pop. 11,012.

OSLER THEORY, William Osler, professor of medicine in Johns Hopkins University, and later of Oxford, in 1904 made the statement that man's best work was done before forty. This statement perverted became the basis of what is known as the Osler theory that men past that age have outlived their usefulness.

OSMAN. See Caliph and Ottoman Empire.

OSMAN DIGNA, a Soudanese slave merchant and lieutenant to the Mahdi, said to have been born of French parents at Rouen in 1836. He has proved himself one of the ablest leaders on the Mahdist side. In 1884 he defeated an Egyptian force under Baker Pasha near the Red Sea coast of the Soudan. He was defeated soon after by a British force, but continued to give trouble till in January, 1900, he was captured.

OSMAN PASHA, Turkish general born at Tokat in Asiatic Turkey, 1832; entered the Turkish army in 1853; his great achievement was the defense of Plevna during the Russo-Turkish war (1877). He afterward held the office of war minister and other high posts. He died in 1900.

OSPREY, a well-known raptorial bird, called also fishing-hawk, fishing-eagle, and sea-eagle. It occurs both in the Old and New World, near the shores of the sea or great rivers and lakes, and builds its nest in high trees and

cliffs. It lives on fish, and pounces with great rapidity on its prey, as it happens to come near the surface of the water, the toes being armed with strong curved nails. The general body-color is a rich brown, the tail being banded with light and dark (in the old birds the tail is pure white), head and neck whitish on their upper portions, and a brown stripe extends from the bill down each side of the neck; under parts of the body whitish, legs of a bluish tint. In length the osprey averages about 2 feet, the wings measuring over 4 feet from tip to tip. The female lays three or four eggs. The American bald-eagle pursues the osprey, who drops his prey with the



Osprey.

view of escaping, when the eagle immediately pounces after the descending fish, and seizes it ere it touches the water.

OSSIFICATION, the process of bone formation, which in all cases consists of the deposition of earthy or calcareous matter. It may take place by the deposition of osseous material in fibrous membranes, and thus the flat bones of the skull are developed; or by deposition in cartilage, as in the case of the long bones of the skeleton. The process of ossification in cartilage begins at various well-marked points called centers of ossification, where proliferation of cartilage cells and a deposit of lime salts occurs. (See also Bone.) Most organs of the body may become the seat of abnormal ossification. Deposits of limy matter take place frequently within the coats of arteries, making them easily ruptured; but this process is rather one of calcification.

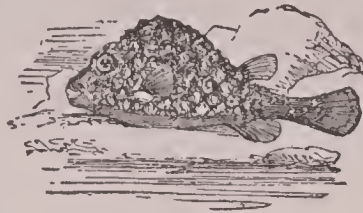
OS'SOLI, Margaret Sarah Fuller, an American authoress, born in 1810, remarkable for her precocious and extensive linguistic attainments. She became associated with Emerson and other eminent literary men. She visited Europe in 1846, married in 1847 the Marchese Ossili; embarked with her husband for New York, but they were wrecked, and both perished off Long Island, July 16, 1850. She wrote several works, including *Women in the Nineteenth Century*, etc.

OSTEOL'OGY, the department of anatomical science specially devoted to a description of the bony parts or skeleton of the body, and included under the wider science of anatomy (which see, as also Skeleton, Bone, etc.).

OSTEOP'ATHY, a method of treating disease by manipulation, the purpose

and result of which is to restore the normal condition of nerve control and blood supply to every organ of the body, by removing physical obstruction or by stimulating or inhibiting activity as the condition may require.

OSTRA'CION, the scientific name of the fishes known as trunk-fishes. The



Ostracion or trunk-fish.

body is inclosed in a literal armor-casing of strong bony plates or scales of the ganoid variety, which are immovably united, and invest every part of the body save the tail, which is movable, but is itself inclosed in a bony casing. These fishes do not attain a large size, and are common in tropical seas.

OS'TRACISM, a political measure practiced among the ancient Athenians by which persons considered dangerous to the state were banished by public vote for a term of years (generally ten), with leave to return to the enjoyment of their estates at the end of the period. It takes this name from the shell or tablet on which each person recorded his vote. Among the distinguished persons ostracized were Themistocles, Aristides, and Cimon, son of Miltiades, who were afterward recalled.

OSTRICH, a cursorial bird that inhabits the sandy plains of Africa and Arabia, and is the largest bird existing, attaining a height of from 6 to 8 feet. The head and neck are nearly naked; the general body plumage is black, the wing and tail feathers white, occasionally with black markings; the quill-feathers of the wings and tail have their barbs wholly disconnected, hence their graceful appearance. The legs are extremely strong, the thighs naked. There are only two toes, the hallux or hind toe being wanting. The pubic bones are united,



African ostrich.

a conformation occurring in no other bird. The wings are of small size and are incapable of being used as organs of flight, but the birds can run with extraordinary speed, outdistancing the fleetest horse. The bill is broad and of a triangular depressed shape. The food

consists of grass, grain, etc., and substances of a vegetable nature, and to aid in the trituration of this food the ostrich swallows large stones, bits of iron and glass, or other hard materials that come in the way. Ostriches are polygamous, each male consorting with several females, and they generally keep together in flocks. The eggs average 3 lbs. in weight, and several hens often lay from ten to twelve each in the same nest, which is merely a hole scraped in the sand. The eggs appear to be hatched mainly by the exertions of both parents relieving each other in the task of incubation, but also partly by the heat of the sun. The South African ostrich is often considered as a distinct species. Three South American birds of the same family are popularly known as the American ostrich, and are very closely allied to the true ostrich, differing chiefly in having the head feathered and three-toed feet, each toe armed with a claw. (See Rhea.) The ostrich has been hunted from the earliest ages for its feathers, which have always been valued as a dress decoration. The feathers of the back are those most valued, the wing and tail feathers rank next. The black plumes are obtained by dyeing.

OSTROGOTHS. See Goths.

OSWE'GO, a city and port in Oswego co., New York, on the Oswego, which here falls into Lake Ontario. It is beautifully situated, regularly and handsomely built, and is the great emporium for the traffic to New York from Canada and the west. It is famous for its vast starch factory, and has extensive mills, tanneries, foundries, machine-shops, and ship-yards. The river supplies ample water-power. The entrance to the port is guarded by Fort Ontario. Pop. 25,230.

OTA'GO, one of the provincial districts of New Zealand, including the whole of the southern part of South Island, south of the districts of Canterbury and Westland, being surrounded on the other three sides by the sea; area about 15,000,000 acres. Pop. 173,111.

OTAL'GIA, a painful affection of the ear. It may be due to inflammation of the ear; it may be a symptom of other diseases; or, it may be a species of neuralgia. It is often associated with other nervous ailments such as toothache, and neuralgic pains in the face; and as its intensity and duration generally depend upon the condition of the latter, otalgia is probably only a local symptom of the other troubles. Children, especially during their fast-growing period, are frequently subjected to otalgic pains. The treatment adopted in neuralgic affections is usually and with success also applied to this complaint.

OTIS, Elwell Stephen, American soldier, was born at Frederick, Md., in 1838. He served throughout the civil war, rising to the rank of lieutenant-colonel. In 1866 he was appointed lieutenant-colonel of the Twenty-second Infantry in the regular army, and by successive promotion became major-general in the regular army in 1900. In 1898 he was sent to the Philippines, where he relieved Major-General Wesley

Merrit as commander of the United States forces and military governor of the islands. He was a member of the first Philippines commission in 1899. In 1900 he was recalled to the United States and assigned to the command of the Department of the Lakes, and in March, 1902, was retired from the service.

OTIS, Fessenden Nott, American surgeon, born at Ballston Spa, N. Y., in 1825. He invented many surgical instruments, of which the more important are the urethrometer, the dilating catheter, and an evacuator for use after lithotomy. He died in 1900.

OTIS, George Alexander, American military surgeon, born in Boston, Mass., in 1830. He was appointed surgeon of United States Volunteers, in 1864 and was assigned to duty as curator of the Army Medical Museum and custodian of the Division of Surgical Records at Washington. Owing to his zeal and energy the museum came to possess the most valuable surgical and anatomical collections in the world. He died in 1881.

OTIS, Harrison Gray, American politician, was born in 1765 in Boston. In 1796 he was elected to the state legislature, and the next year was sent to congress as a federalist. In 1817 he was elected United States senator and mayor of Boston in 1829. His brilliant oratorical powers made him a leader in the senate, where he opposed the further extension of slavery. He died in 1848.

OTIS, James, American statesman, born in West Barnstable, Mass., in 1725. He became prominent by resigning his office of advocate-general in 1761 rather than argue in favor of writs of assistance, i.e., general search warrants for the discovery of smuggled goods into the colony. In 1762 he was elected to the legislature. In 1765 he made a motion which was carried that a congress of representatives from the various colonies be convened. The Stamp Act Congress of 1765 was the result. In 1769 he was accused in England of treason which he publicly denounced. In 1771 he was again returned to the legislature. He died in 1783.

OTITIS, inflammation of the ear, accompanied with intense pain. Within the tympanum it is called internal, beyond it external otitis; and like all other inflammations it may be acute or chronic. Scrofulous and syphilitic constitutions are particularly liable to this disease. Internal otitis is often a serious malady, producing fever and delirium, and ending in suppuration, and generally in the rupture of the tympanum and more or less deafness. The treatment is similar to that of other inflammatory ailments.

OTTAR OF ROSES. See Attar.

OTTAWA, a river in the Dominion of Canada, forming for a considerable part of its length the boundary between the provinces of Quebec and Ontario.

OTTAWA, a city in the prov. of Ontario, capital of the Dominion of Canada, on the right bank of the Ottawa about 90 miles above its confluence with the St. Lawrence, 100 miles west of Montreal, and on the Canadian Pacific railway. The city, divided into the Upper and Lower town by the Rideau Canal,

has wide streets crossing at right angles, and some of the finest buildings in the Dominion. The chief are the government buildings, constructed of light-colored sandstone in the Italian-Gothic style. The educational institutions include a Roman Catholic College, the Canadian Institute, the Mechanics' Institute and Athenæum, etc. Ottawa has important and increasing manufacturers, and is the great center of the lumber trade. It is connected with Hull, on the Quebec side of the Ottawa, by a suspension bridge. In 1858 it became the capital of Upper and Lower Canada. Part of it was destroyed by fire in 1900. Pop. 59,902.

OTTAWA, a town in Illinois, at the junction of the Illinois and Fox rivers, 84 miles southwest of Chicago. Pop. 12,424.

OTTER, a carnivorous mammal. There are several species differing chiefly in size and fur. They all have large flattish heads, short ears, webbed toes, crooked nails, and tails slightly flattened horizontally. The common river-otter of Europe inhabits the banks of rivers, feeds principally on fish, and is often very destructive, particularly to salmon. The under fur is short and woolly, the outer is composed of longer



Canada otter.

and coarser hairs of dark brown hue. They burrow near the water's edge, line their nests with grass and leaves, and produce from four to five young. The weight of a full-grown male is from 20 to 24 lbs.; length from nose to tail 2 feet, tail 15 to 16 inches. The American or Canadian otter averages about 4 feet in length inclusive of the tail. It is plentiful in Canada, and furnishes a valuable fur, which is a deep reddish-brown in winter, and blackish in summer. The sea-otters represented typically by the great sea-otter, inhabit the coasts of the North Pacific Ocean, but are of comparatively rare occurrence. The tail is short, measuring about 7 inches only; weight 60 to 70 lbs. The fur is soft, and of a deep lustrous black, or of a dark maroon color when dressed, and much prized. In general appearance the sea-otter somewhat resembles a small seal.

OTTO, German sovereign. See Otho.

OTTOMAN EMPIRE, the Turkish Empire, the territories in Europe, Asia, and Africa more or less under the sway of the Turkish sultan. In Europe, besides the immediate provinces in the Balkan Peninsula, are Bulgaria (with Eastern Roumelia), and Bosnia, Herzegovina, etc., held by Austria; in Asia, Asia Minor, Syria, including Palestine, Mesopotamia, part of Arabia, Candia,

and others of the islands of the Archipelago; in Africa, Egypt, over which there is a nominal suzerainty, and the vilayet of Tripoli. Formerly the empire was much more extensive, even in recent times comprising Greece, Roumania, Servia, Bessarabia, Tunis, etc. We shall here give a brief sketch of the history of the Ottoman Empire, referring to the article Turkey for information regarding the geography, constitution, etc., of Turkey proper.

The Ottoman Turks came originally from the region of the Altai mountains, in Central Asia, and in the 6th century A.D. pushed onward to the west in connection with other Turkish tribes. Early in the 8th century they came in contact with the Saracens, from whom they took their religion, and of whom they were the first slaves and mercenaries, and finally the successors in the caliphate. In the 13th century they appeared as allies of the Seljukian Turks against the Mongols, and for their aid received a grant of lands from the Seljuk sultan of Iconium in Asia Minor. Their leader, Othman or Osman, of the race of Oghuzian Turkomans, became the most powerful emir of Western Asia, and after the death of the Seljuk sultan of Iconium in the year 1300 he proclaimed himself sultan. He died in 1326. Thus was founded upon the ruins of the Saracen, Seljuk, and Mongol power the Empire of the Osman or Ottoman Turks in Asia; and after Osman, the courage, policy, and enterprise of eight great princes, whom the dignity of caliph placed in possession of the standard of the prophet, and who were animated by religious fanaticism and a passion for military glory, raised it to the rank of the first military power in both Europe and Asia (1300-1566).

In the latter part of the 16th century, and most of the 17th century, the chief wars were with Venice and with Austria. The battle of Lepanto (1571), in which the Ottoman fleet was overthrown by the combined fleets of Venice and Spain, was the first great Ottoman reverse at sea; and the battle of St. Gothard (1664), near Vienna, in which Montecuculi defeated the Vizier Kiuprili, the first great Ottoman reverse on land. In 1683 Vienna was besieged by the Turks, but was relieved by John Sobieski and Charles of Lorraine; in 1687 the Turks were again defeated at Mohacz, and in 1697 (by Prince Eugene at Senta). Then followed the Treaty of Carlowitz in 1699, by which Mustapha II. agreed to renounce his claims upon Transylvania and a large part of Hungary, to give up the Morea to the Venetians, to restore Podolia and the Ukraine to Poland, and to leave Azov to the Russians. Eugene's subsequent victories at Peterwardein and Belgrade, obliged the Porte to give up, by the Treaty of Passarowitz in 1718, Temeswar, Belgrade, with a part of Servia and Walachia; but the Turks on the other hand took the Morea from Venice, and by the Treaty of Belgrade in 1739 regained Belgrade, Servia, and Little Walachia, while for a time they also regained Azov.

Russia, which had been making steady advances under Peter the Great

and subsequently, now became the great opponent of Turkey. In the middle of the 18th century the Ottoman Empire still embraced a large part of Southern Russia. The victories of Catharine II.'s general Romanzoff in the war between 1768 and 1774 determined the political superiority of Russia, and at the Peace of Kutchuk-Kainargi, in 1774, Abdul-Hamid was obliged to renounce his sovereignty over the Crimea, to yield to Russia the country between the Bog and the Dnieper, with Kinburn and Azov, and to open his seas to the Russian merchant ships. By the Peace of Jassy, 1792, which closed the war of 1787-91, Russia retained Taurida and the country between the Bog and the Dniester, together with Otchakov, and gained some accessions in the Caucasus. In the long series of wars which followed the French revolution the Ottoman Empire first found herself opposed to France, in consequence of Bonaparte's campaign in Egypt, and finally to Russia, who demanded a more distinct recognition of her protectorate over the Christians, and to whom, by the Peace of Bucharest, May 28, 1812, she ceded that part of Moldavia and Bessarabia which lies beyond the Pruth. In 1817 Mahmud II. was obliged to give up the principal mouth of the Danube to Russia. Further disputes ended in the Porte making further concessions, which tended toward loosening the connection of Servia, Moldavia, and Walachia with Turkey. In 1821 broke out the war of Greek independence. The remonstrances of Britain, France, and Russia against the cruelties with which the war against the Greeks was carried on proving of no avail, those powers attacked and destroyed the fleet of Mahmud at Navarino (1827). In 1826 the massacre of the Janizaries took place at Constantinople, after a revolt. In 1828-29 the Russians crossed the Balkans and took Adrianople, the war being terminated by the Peace of Adrianople (1829). In that year Turkey had to recognize the independence of Greece. In 1831-33 Mehemet Ali, nominally Pasha of Egypt, but real ruler both of that and Syria, levied war against his sovereign in 1833, and threatened Constantinople; when the Russians, who had been called on for their aid by the sultan, forced the invaders to desist. In 1840 Mehemet Ali again rose against his sovereign; but through the active intervention of Great Britain, Austria, and Russia, was compelled to evacuate Syria, though he was, in recompense, recognized as hereditary viceroy of Egypt.

The next important event in the history of the Ottoman Empire was the war with Russia in which Turkey became involved in 1853, and in which she was joined by England and France in the following year. This war, known as the Crimean war (which see), terminated with the defeat of Russia, and the conclusion of a treaty at Paris on the 30th of March, 1856, by which the influence of Russia in Turkey was greatly reduced. The principal articles were the abolition of the Russian protectorate over the Danubian principalities (the Moldavia and Walachia, united in 1861 as the

principality of Roumania), the rectification of the frontier between Russia and Turkey, and the cession of part of Bessarabia to the latter power.

In 1875 the people of Herzegovina, unable to endure any longer the misgovernment of the Turks, broke into rebellion. A year later the Servians and Montenegrins likewise took up arms, and though the former were unsuccessful and obliged to abandon the war, the Montenegrins still held out. Meantime the great powers of Europe were pressing reforms on Turkey, and at the end of 1876 a conference met at Constantinople with the view of making a fresh settlement of the relations between her and her christian provinces. All the recommendations of the conference were, however, rejected by Turkey; and in April following Russia, who had been coming more and more prominently forward as the champion of the oppressed provinces and had for months been massing troops on both the Asiatic and the European frontier of Turkey, issued a warlike manifesto and commenced hostile operations in both parts of the Turkish Empire. She was immediately joined by Roumania, who on the 22d of May (1877) declared her independence. The progress of the Russians was at first rapid; but the Turks offered an obstinate resistance. After the fall of Kars, however, November 18, and the fall of Plevna, December 10, the Turkish resistance completely collapsed, and on the 3d of March, 1878, Turkey was compelled to agree to the Treaty of San Stefano, in which she accepted the terms of Russia. The provisions of this treaty were, however, considerably modified by the Treaty of Berlin concluded on the 13th of July following by which Roumania, Servia, and Montenegro were declared independent; Roumanian Bessarabia was ceded to Russia; Austria was empowered to occupy Bosnia and Herzegovina; and Bulgaria was made a principality. (See Berlin, Treaty of.) The main events in the history of the Ottoman Empire since the Treaty of Berlin are the French invasion of Tunis in 1881, leading to a French protectorate; the treaty with Greece, executed under pressure of the great powers in 1881 by which Greece obtained Thessaly and a strip of Epirus; the occupation of Egypt by Britain in 1882; and the revolution at Philippopolis in 1885, by which Eastern Rumelia became united with Bulgaria. More recent events include the massacres of Armenians in 1895-96; the Cretan insurrection and the consequent war with Greece in 1897, resulting in the defeat of the latter; the granting of autonomy to Crete in 1898; and the Macedonian revolt of 1903. Bosnia and Herzegovina were annexed by Austria. Bulgaria proclaimed its independence; the sultan proclaimed a constitution in 1908.

OTTUMWA, a city in Iowa, on the Des Moines river, 75 miles n.w. of Burlington, an important railroad center and a place of growing commercial and industrial activity. Pop. 18,197.

OUBLIETTE (ô'bli-et), a dungeon existing in some old castles and other buildings, with an opening only at the top for the admission of air. It was used

for persons condemned to perpetual imprisonment or to perish secretly.

ODUH, or **OUDE** (oud), a province of British India, bounded on the north by Nepaul, and on the other sides by the province of Agra; area, 24,246 sq. miles. Lucknow is the capital, and the main center of population and manufactures. Pop. 12,833,077 (mostly Hindus), giving the large average of 521 to the sq. miles.

ODUH (formerly Ayodhya), an ancient town in Faizabad district, Oudh, adjacent to Faizabad, on the river Gogra. In remote antiquity it was one of the largest and most magnificent of Indian cities, and is famous as the early home of Buddhism and of its modern representative, Jainism. A great fair, attended by about 500,000 people, is held every year. Pop. 11,643.

UDINOT (ô-di-nô), Charles Nicolas, Duke of Reggio, peer and marshal of France, born in 1767. In 1791 he was elected commandant of a volunteer battalion. In 1792 he was colonel of the regiment of Picardy, in 1793 brigadier-general, and in 1799 general of division. Masséna made him chief of the general staff, and under his command he decided the battle of the Mincio. In 1804 Napoleon gave him the command of a grenadier corps of 10,000 men, which was to form the advance-guard of the main army. At the head of these troops he performed many exploits, winning the battle especially of Ostrolenka, and deciding the fate of three great battles—Austerlitz, Friedland, and Wagram. After the last-named battle Napoleon made him a marshal and Duke of Reggio. After Napoleon's abdication he gave in his adhesion to the Bourbons, to whom he ever afterward remained faithful, and who heaped upon him every honor. He died in 1847.—His eldest son, Nicolas Charles Victor (born 1791), commanded the troops which effected the capture of Rome from Garibaldi in 1849. He died in 1863.

QUIDA (wē'da). See Ramée, Louisa de la.

OUNCE, in Troy weight, is the twelfth part of a pound, and weighs 480 grains; in avoirdupois weight is the sixteenth part of a pound, and weighs 437½ grains Troy.

OUTRAM (ou'tram), Lieutenant-General Sir James, was born at Butterley Hall, Derbyshire, 1803. In 1842 he was appointed commissioner to negotiate with the Ameers of Sind. In 1856 he was nominated chief commissioner of Oudh. He was commander-in-chief of the British forces in the Persian war of 1856-57. Although of higher rank than Havelock, he fought under him until Lucknow was relieved by Sir Colin Campbell. In the following March he commanded the first division of infantry when Sir Colin finally regained possession of Lucknow. His services were rewarded with a baronetcy, the rank of lieutenant-general, the order of the grand-cross of the Bath, and the thanks of parliament; and statues were erected in his honor in London and Calcutta. He died at Pau in 1863, and was buried in Westminster Abbey.

OUTRIGGER, an iron bracket fixed on the side of a boat, with a rowlock at its extremity, so as to give an increased

leverage to the oar without widening the boat; hence, a light boat for river matches provided with such apparatus. The name is also applied to a contrivance in certain boats and canoes, consisting of a projecting framework or arrangement of timbers for counterbalancing the heeling-over effect of the sails, which are large in proportion to the breadth of the vessel.

OUZEL (ou'z'l), a genus of insessorial or perching birds, included in the family



Ring-ouzel.

of the thrushes. The specific name of the common or ring ouzel is derived from the presence of a broad semilunar patch or stripe of white extending across its breast. The water ouzel belongs to a different family. (See Dipper.) Ouzel is also an old or poetical name for the blackbird.

OVAL, an egg-shaped curve or curve resembling the longitudinal section of an egg. The oval has a general resemblance to the ellipse, but, unlike the latter, it is not symmetrical, being broader at one end than at the other.

OVARIAN TUMOR, a morbid growth in the ovary of a woman, sometimes weighing as much as 30, 50, or upward of 100 lbs. or more, consisting of a cyst containing a thin or thick ropy fluid, causing the disease known as ovarian dropsy, which is now generally cured by the operation of ovariectomy.

OVARIO-TOMY, the operation of removing the ovary, or a tumor in the ovary (see above); a surgical operation first performed in 1809, and long considered exceedingly dangerous, but latterly performed with great and increasing success, especially since the adoption of the antiseptic treatment inaugurated by Lister.

O'VARY, or **OVARIVM**, the essential part of the female generative apparatus in which the ova or eggs are formed and developed. The ovary in the female corresponds to the testis of the male. In adult women the ovaries exist as two bodies of somewhat oval shape, and compressed from side to side, of whitish color and uneven surface. They are situated one on each side of the womb, and are attached to the hinder portion of the body of the womb by two thin cord-like bands—the ovarian ligaments, and by a lesser fibrous cord to the fringed edge of the fallopian tube. Each ovary is about 1½ inch in length, and

about 1½ drachms in weight, and contains a number of vesicles known as ovisacs or Graafian follicles, in which the ova are developed. The functions of the ovary, which are only assumed and become active on the approach of puberty, are the formation of ova, their maturation, and their final discharge at periodic menstrual epochs into the uterus or womb. There the ovum may be impregnated and detained, or pass from the body with the menstrual flow. The ovaries are subject to diseased conditions, chief among which are cancer and the occurrence of tumors and cysts. See Ovarian Tumor, Ovariectomy.

O'VARY, in botany, is a hollow case inclosing ovules or young seeds, containing one or more cells, and ultimately becoming the fruit. Together with the style and stigma it constitutes the female system of the vegetable kingdom. When united to the calyx it is called inferior; when separated, superior.

OVIATION. See Triumph.

OVEN, a close chamber of any description in which a considerable degree of heat may be generated, used for baking, heating, or drying any substance.

OVEN BIRDS, birds belonging to the family Certhiidae or Creepers, found in South America. They are all of small size, and feed upon seeds, fruits, and insects. Their popular name is derived



Oven-bird.

from the form of their nest, which is dome-shaped, and built of tough clay or mud with a winding entrance.

O'VENS RIVER, a river in the north-east of the Australian colony of Victoria, a tributary of the Murray. The district is an important gold-mining and agricultural one.

OVERLAND ROUTE to India, the route via Dover, Calais, Paris, Macon, the Mont Cenis Tunnel, Modena, to Brindisi, thence by steamer to Port Said, through the Suez Canal, and down the Red Sea to the destined Indian port. Alternative routes are from Marseilles or Trieste by steamer to Alexandria, and thence by rail to Ismailia.

OVERSHOT WHEEL, a wheel driven by water shot over from the top. The buckets of the wheel receive the water as nearly as possible at the top, and retain it until they approach the lowest point of the descent. The water acts principally by its gravity, though some effect is of course due to the velocity with which it arrives.

O'VERTURE, in music, an introductory symphony, chiefly used to precede great musical compositions, as oratorios and operas, and intended to prepare the hearer for the following composition,

properly by concentrating its chief musical ideas so as to give a sort of outline of it in instrumental music. This mode of composing overtures was first conceived by the French. Overtures are, however, frequently written as independent pieces for the concert-room.



Overshot water-wheel.

OVIBOS. See Musk-ox.

OVID, in full Publius Ovidius Naso, a celebrated Roman poet, born 43 B.C. He enjoyed a careful education, which was completed at Athens, where he gained a thorough knowledge of the Greek language. He afterward traveled in Asia and Sicily. He never entered the senate, although by birth entitled to that dignity, but filled one or two unimportant public offices. Till his fiftieth year he continued to reside at Rome, enjoying the friendship of a large circle of distinguished men. By an edict of Augustus, however (A.D. 8), he was commanded to leave Rome for Tomi, a town on the inhospitable shores of the Black Sea, near the mouths of the Danube. Ovid died at Tomi in the year 18 A.D. His works include love elegies; letters of heroines to their lovers or husbands; Art of Love, Love Remedies, the Metamorphoses, in fifteen books; Fasti, a sort of poetical calendar; Tristia; Epistolae ex Ponto, Epistles from Pontus, etc.

OVIDUCT, the name given to the canal by which, in animals, the ova or eggs are conveyed from the ovary to the uterus or into the external world. In mammals the oviducts are termed Fallopian tubes, being so named after the anatomist who first described them.

OVIEDO (ō-vi-ā'dō), a town of Spain, capital of a province of same name, 230 miles northwest of Madrid. Pop. 48,103.—The province, area 4080 square miles, pop. 627,069, is situated on the Bay of Biscay, and bounded by the provinces of Santander, Leon, and Lugo.

OVUM, the "egg" or essential product of the female reproductive system, which, after impregnation by contact with the semen or essential fluid of the male, is capable of developing into a new and independent being. The essential parts to be recognized in the structure of every true ovum or egg consist, firstly, of an outer membrane known as the vitelline membrane. Within this is contained the vitellus or yolk, and imbedded in the yolk-mass the germinal vesicle and smaller germinal spot are seen. See Ovary, Reproduction.

OWEN, John, D.D., English Nonconformist divine, born at Stadham, Oxfordshire, in 1616. He was appointed to preach at Whitehall the day after the execution of Charles I.; accompanied

Cromwell in his expeditions both to Ireland and Scotland; in 1651 was made dean of Christ Church College, Oxford, and in 1652 was nominated by Cromwell, then chancellor of the university, his vice-chancellor, offices of which he was deprived in 1657. He died in 1683.

OWEN, Sir Richard, K.C.B., comparative anatomist and palæontologist, was born at Lancaster 1804. Having settled in the metropolis he became assistant curator of the Hunterian Museum. In 1834 he was appointed professor of comparative anatomy at St. Bartholomew's hospital; in 1836 professor in anatomy and physiology



Sir Richard Owen.

at the Royal College of Surgeons, and in 1856 superintendent of the natural history department in the British Museum, from which last post he retired in 1883. He died in 1892. He was the greatest palæontologist since Cuvier, and as a comparative anatomist was a worthy successor to Hunter. He was a voluminous writer on his special subjects, and an honorary fellow of nearly every learned society of Europe and America.

OWEN, Robert, philanthropist and social theorist, born at Newtown, Montgomeryshire, North Wales, in 1771, died there 1858. In 1812 he published *New Views of Society, or Essays upon the Formation of Human Character*; and subsequently a *Book of the New Moral World*, in which he completely developed his socialistic views, insisting upon an absolute equality among men. He had three opportunities of setting up social communities on his own plan—one at New Harmony in America, another at Orbiston in Lanarkshire, and the last in 1844, at Harmony Hall in Hampshire, all of which proved signal failures. In his later years Mr. Owen became a firm believer in Spiritualism. His eldest son, Robert Dale Owen (1801-77), for a time resident minister of the United States at Naples, is chiefly known as an exponent of spiritualism. He was author of several works on that and other subjects. Another son, David Dale Owen (1807-60), acquired reputation as a geologist.

OWEN, Robert Dale, social reformer, was born at Glasgow, Scotland, in 1801. He came to the United States in 1825. He was elected to the Indiana legislature in 1835. He was a member of congress in 1843-47. He took a leading part in the settlement of the Northwestern

boundary, in the Oregon question, and in founding the Smithsonian Institution. From 1853 to 1858 he was chargé d'affaires and minister at Naples. He served in the ordnance commission and the Freedmen's Bureau during the civil war. Owen was a zealous advocate of Spiritualism. His chief publications are: *Outlines of the System of Education at New Lanark*, *Moral Physiology*, *Footfalls on the Boundary of Another World*, *The Wrong of Slavery*, *Debatable Land Between This World and the Next*. He died in 1877.

OWENSBORO, the capital of Daviess county, Kentucky, on the Ohio, 160 miles from Louisville, is extensively engaged in the curing of tobacco and the manufacture of whisky. Pop. 15,325.

OWENS COLLEGE, Manchester, was established under the will of John Owens, a Manchester merchant, who died in 1846, and left about \$500,000 for the purpose of founding an institution for providing a university education, in which theological and religious subjects should form no part of the instruction given.

OWL PARROT, the type and only known representative of a peculiar group of the parrot family, is a large bird, a native of the South Pacific Islands, and especially of New Zealand. In aspect and in nocturnal habits it resembles the owl. It feeds on roots, which it digs out of the earth with its hooked beak. It seldom flies; it is generally to be seen resting in hollow stumps and logs, and is said to hibernate in caves.

OWLS, a group of birds forming a well-defined family, which in itself represents the Nocturnal Section of the



Barn-owl.

order of Raptores or Birds of Prey. The head is large and well covered with feathers, part of which are generally arranged around the eyes in circular discs, and in some species form horn-like tufts on the upper surface of the head. The beak is short, strongly curved and hooked. The ears are generally of large size, prominent, and in many cases provided with a kind of fleshy valve or lid, and their sense of hearing is exceedingly acute. The eyes are very prominent and full, and project forward, the pupils being especially well developed—a structure enabling the owls to see well at dusk or in the dark. The plumage is of soft downy character, rendering their flight almost noiseless. The tarsi are feathered, generally to the very base of the claws, but some forms, especially those of fish-catching habits, have the toes and even the tarsi bare. The toes are arranged three forward and

one backward; but the outer toe can be turned backward at will, and the feet thus converted into hand-like or prehensile organs. In habits most species of owls are nocturnal, flying about during the night, and preying upon the smaller quadrupeds, nocturnal insects, and upon the smaller birds. Mice in



Long-eared owl.

particular form a large part of their food. During the day they inhabit the crevices of rocks, the nooks and crannies of old or ruined buildings, or the hollows of trees; and in these situations the nests are constructed. They vary greatly in size, the smallest not being larger than a thrush. In their distribution the owls occur very generally over the habitable globe, both worlds possessing typical representatives of the group. The common white or barn owl is the owl which has the greatest geographical range, inhabiting almost every country in the world. The tawny or brown owl is the largest of the species indigenous to Britain, and is strictly a woodland bird, building its nest in holes of trees. The genus *Asio* contains the so-called horned owls, distinguished by elongated horn-like tufts of feathers on the head. The long-eared owl appears to be common to both Europe and America. It inhabits woods. The short-eared owl frequents heaths, moors, and the open country generally to the exclusion of woods. It has an enormous geographical range. The eagle owl is rare in Britain, but occurs in Norway, Sweden, and Lapland, and over the continent of Europe to the Mediterranean. A similar species extends over the whole of North America. Owls of diurnal habits are the hawk owl and the snowy owl. The hawk owl mostly inhabits the Arctic regions, but migrates southward in winter, as does the snowy owl, which is remarkable for its large size and snowy plumage. The



Burrowing owl.

little owl, the bird of Pallas Athena, is spread throughout the greater part of Europe, but is not a native of Britain. One of the most remarkable of owls is

the burrowing owl of America and the West Indies, which inhabits the burrows of the marmots (which see), or prairie-dogs—the owls possessing them-



Nest of burrowing owl.

selves of these burrows and breeding therein, much to the discomfort of the original possessors of the abodes.

OX, the general name of certain well-known ruminant quadrupeds. The characters are: the horns are hollow, supported on a bony core, and curved outward in the form of crescents; there are eight incisor teeth in the under jaw, but none in the upper; there are no canines or dog-teeth; the naked muffle is broad. The common ox is one of the most valuable of our domestic animals. Its flesh is the principal article of animal food; and there is scarcely any part of the animal that is not useful to mankind; the skin, the horns, the bones, the blood, the hair, and the very refuse of all these, have their separate uses. Having been specially domesticated by man from a stock which it is probably impossible to trace, the result has been the formation of very many breeds, races, or permanent varieties, some of which are valued for their flesh and hides, some for the richness and abundance of their milk, while others are in great repute both for beef and milk. The name of ox is used also in a more restricted sense to signify the male of the bovine genus castrated, and full-grown, and nearly so. The young castrated male is called a steer. He is called an ox-calf or bull-calf until he is a year old, and a steer until he is four years old. The same animal not castrated is called a bull.

OXALIC ACID, an acid which occurs, combined sometimes with potassium or sodium, at other times with calcium, in wood-sorrel and other plants; and also in the animal body, especially in urine, in urinary deposits and in calculi. Many processes of oxidation of organic bodies produce this substance. Thus sugar, starch, cellulose, etc., yield oxalic acid when fused with caustic potash, or when treated with strong nitric acid. Sawdust is very much used for producing the acid. Oxalic acid is a solid substance, which crystallizes in four-sided prisms, the sides of which are alternately broad and narrow, and the summits dihedral. They are efflorescent in dry air, but attract a little humidity if it be damp. They are soluble in water, and their acidity is so great that, when dissolved in 3600 times their weight in water, the solution reddens litmus paper, and is perceptibly acid to the taste. Oxalic acid is used chiefly as a discharging agent in certain styles of calico-printing, for whitening leather, as in boot-tops, and for removing ink and iron mould

from wood and linen. It is a violent poison. Oxalates are compounds of oxalic acid with bases; one of them, binoxalate of potash, is well known as salts of sorrel, or salts of lemon.

OXFORD, a city and county borough in England, capital of Oxford county, and seat of one of the most celebrated universities in the world is situated about 50 miles w.n.w. London, on a gentle acclivity between the Cherwell and the Thames, here called the Isis. Oxford, as a city of towers and spires, of fine collegiate buildings old and new, of gardens, groves, and avenues of trees, is unique in England. Of the university buildings the most remarkable are Christ's Church, the largest and grandest of all the colleges, with a fine quadrangle and other buildings, a noble avenue of trees (the Broad Walk), the cathedral serving as its chapel; Magdalen college, considered to be the most beautiful and complete of all; Balliol College, with a modern front (1867-69) and a modern Gothic chapel; Brasenose college; and New college (more than 500 years old), largely consisting of the original buildings, and especially noted for its gardens and cloisters; besides the Sheldonian theater, a public hall of the university; the new examination schools, new museum, Bodleian library, Radcliffe library, and other buildings belonging to the university. Pop. 49,413.—Oxford county is bounded by Northampton, Warwick, Gloucester, Berks, and Buckingham; area, 483,621 acres, of which more than five-sixths are under crops or in grass. Manufactures are of little importance. The principal rivers are the Thames or Isis, Thame, Evenlode, Cherwell, and Windrush. Pop. 182,768.

OXFORD UNIVERSITY, one of the two great English universities, established in the middle ages, and situated in the city of Oxford (which see). Like Cambridge it embraces a number of colleges forming distinct corporations, of which the oldest is believed to be University college, dating from 1253, though Merton college was the first to adopt the collegiate system proper. The following list contains the name of the colleges, with the time each was founded:

1. University college.....	1253
2. Balliol college.....	1268
3. Merton college.....	1274
4. Exeter college.....	1314
5. Oriel college.....	1326
6. Queen's college.....	1340
7. New college.....	1379
8. Lincoln college.....	1427
9. All Souls' college.....	1437
10. Magdalen college.....	1458
11. Brasenose college.....	1509
12. Corpus Christi college...	1516
13. Christ Church college....	1546
14. Trinity college.....	1554
15. St. John's college.....	1555
16. Jesus college.....	1571
17. Wadham college.....	1612
18. Pembroke college.....	1624
19. Worcester college.....	1714
20. Keble college.....	1870
21. Hertford college.....	1874

Students enter as commoners or as "scholars" or "exhibitioners," according as they obtain some of the numerous scholarships or exhibitions which may

be competed for. The degrees conferred are those of Bachelor and Master in Arts, and Bachelor and Doctor in Music, Medicine, Civil Law, and Divinity. Twelve terms of residence are required for the ordinary degree of B.A. No further residence is necessary for any degree, and no residence whatever is required for degrees in music. Women were admitted to the examinations in 1884, but do not receive degrees. Three colleges for women have been established: Somerville hall, Lady Margaret hall, and St. Hugh's hall. Mansfield college, for the education of men for the nonconformist ministry, was established in 1888. The total number of students is about 3000. The total number of professorships, etc., in the university is about fifty. The institutions connected with the university include: the Bodleian library (the second in the kingdom), the Ashmolean museum, Botanic gardens, Taylor institution for modern languages, University museum, Radcliffe library, Observatory, and Indian institute. Affiliated colleges are: St. David's college, Lampeter (1880); University college, Nottingham (1882); and Firth College, Sheffield (1886).

OXIDES, the compounds of oxygen with one other element; thus hydrogen and oxygen form oxide of hydrogen or hydrogen oxide, oxygen and chlorine form a series of oxides of chlorine, oxygen and copper form oxide of copper or copper oxide, and so on. When two oxides of the same element exist, the name of that which contains the greater proportion of oxygen ends in ic, while the name of the oxide containing less oxygen ends in ous; thus we have nitrous oxide, and nitric oxide. If there be several oxides they may be distinguished by such prefixes as hypo, per, etc., or by the more exact prefixes mono, di, tri, tetra, etc. For the different oxides see the articles on the individual chemical elements.

OXUS, a large river in Central Asia. The principal head-stream of the Oxus is by some considered to be the Panja river, which rises in a lake of the Great Pamir, at a height of 13,900 feet. The Oxus for a considerable distance forms the boundary between Afghanistan and Bokhara. Total course, 1300 miles.

OXYGEN, a gas which is the most widely distributed of all the elements. Eight-ninths by weight of water, one-fourth of air, and about one-half of silica, chalk, and alumina consist of oxygen. It enters into the constitution of nearly all the important rocks and minerals; it exists in the tissues and blood of animals; without it we could not live, and by its agency disintegration of the animal frame is carried on after death. All processes of respiration are carried on through the agency of oxygen, all ordinary processes of burning and of producing light are possible only in the presence of this gas. Oxygen is invisible, inodorous, and tasteless; it is the least refractive, but the most magnetic of all the gases; it is rather heavier than air, having a specific gravity of 1.1056, referred to air as 1.00; it is soluble in water to the extent of about three volumes in 100 volumes of water at ordinary temperatures. Oxygen was liquefied for the

first time in 1877 by the application of intense cold and pressure; it has even been solidified. It is possessed of very marked chemical activity, having a powerful attraction for most of the simple substances, the act of combining with which is called oxidation. Some substances when brought into contact with this gas unite with it so violently as to produce light and heat; in other cases oxidation is much more gradual, as in the rusting of metals. The presence of oxygen is, so far as we know, one of the physical conditions of life. In inspiring we receive into the lungs a supply of oxygen; this oxygen is carried by the blood to the various parts of the body, and there deposited to do its work of tissue-forming, etc.; the de-oxygenated blood returns to the lungs, and again receives a fresh supply of the necessary oxygen. Trees and plants evolve oxygen, which is formed by the decomposition of the carbonic acid absorbed by the leaves from the atmosphere. This is due to the action of the sun's rays and the chlorophyll or green coloring matter of the leaves. When oxygen unites with another element the product is called an oxide. The oxides form a most important series of chemical compounds (see Oxides and the articles on the various chemical elements). The power of supporting combustion is one of the leading features of oxygen and until the discovery of oxygen no well-founded explanation of the facts of combustion was known. Oxygen exists in another form different from that of the ordinary gas; in this form it exhibits many marked peculiarities. See Ozone.

OXYHYDROGEN LIGHT, or **LIME-LIGHT**, a brilliant light produced when a jet of mixed oxygen and hydrogen gas is ignited and directed on a solid piece of lime. It is commonly used in magic lantern exhibitions; and the two gases are kept in separate air-tight bags, or

iron cylinders into which the gas is forced under very high pressure. From these receptacles tubes conduct the gases to meet in a common jet.

OXYHYDROGEN MICROSCOPE, one in which the object is illuminated by means of the oxyhydrogen light, and a magnified image of it thrown on a screen.

OYER AND TERMINER, in English law, is a commission directed to two of the judges of the circuit and other gentlemen of the county to which it is issued by virtue of which they have power, as the terms imply, to hear and determine certain specified offenses. The commissions of oyer and terminer are the most comprehensive of the several commissions which constitute the authority of the judges of assize on the circuits.

OYSTER, an edible mollusc, and a near ally of the mussels, etc. It is distinguished by the possession of an inequivalve shell, the one half or valve being larger than the other. The shell may be free, or attached to fixed objects, or may be simply imbedded in the mud. The foot is small and rudimentary, or may be wanting. A single (adductor) muscle for closing the shell is developed. The common oyster is the most familiar member of the genus. The fry or fertilized ova of the oyster are termed "spat," and enormous numbers of ova are produced by each individual from May or June to September—the spawning season. The spat being discharged, each embryo is found to consist of a little body enclosed within a minute but perfectly formed shell, and possessing vibratile filaments or cilia, by which the young animal at first swims freely about, and then attaches itself to some object. In about three years it attains its full growth. The oysters congregate together in their attached state to form large submarine tracts or "oyster-beds," as they are termed. In England the Gravesend beds, and those extending along the coasts of Kent and Essex, are

celebrated; in Scotland the beds in the Firth of Forth; in France, those of Rochelle, Rochefort, Ré and Oléron, Cancale, and Granville; in Denmark the Schleswig beds and those at the north point of Jutland; in America the beds of Virginia, of Georgia, and of Long Island. The most common American species is found on the Atlantic coast from the Gulf of St. Lawrence to the Gulf of Mexico. The most favorable bottom and locality for oyster-beds appear to be those situated in parts where the currents are not too strong, and where the sea-bed is shelving, and covered by mud and gravel deposits.

The United States and France are the chief seats of the oyster industry. In the United States the natural oyster beds are still a source of great wealth, while in Europe the native beds have long since been practically destroyed. Large quantities of American oysters are now sent to Europe; and the American are generally larger than the European.

OZONE, a modified—technically an allotropic—form of oxygen. Two volumes of ozone contain three volumes of oxygen condensed to two volumes. Ozone exists in small quantities in pure country air, and is produced in various ways. When an electric machine is set in operation a peculiar smell may be perceived; after a discharge of lightning the same smell is perceptible. The substance which manifests this odor is ozone, and in each of those cases ozone is produced. Ozone acts as a very powerful oxidizer; for this reason it is of great service in the atmosphere, as it so readily oxidizes, and thus renders comparatively un hurtful, animal effluvia and other obnoxious products of animal or vegetable decomposition. Ozone rapidly bleaches indigo, converting it into a white substance called isatin, which contains more oxygen than the indigo itself.

P

P, the sixteenth letter and twelfth consonant in the English alphabet. It is one of the mutes and labials, and represents a sound produced by closely compressing the lips till the breath is collected, and then letting it issue. See B.

PACA, a genus of rodents. The common paca is one of the largest of the



The brown paca.

rodents, being about 2 feet long and about 1 foot high. In form it is thick and clumsy, and the tail is rudimentary. In habits the pacas are chiefly nocturnal

and herbivorous. They excavate burrows, run swiftly, and swim and dive with facility. They are found in the eastern portion of South America, from Paraguay to Surinam. The flesh is said to be savory.

PACE, a measure of length, used as a unit for long distances. It is derived from the Latin passus, which was, however, a different measure, the Latin passus being measured from the mark of the heel of one foot to the heel of the same foot when it next touched the ground, thus stretching over two steps; while the English pace is measured from heel to heel in a single step. The Latin pace was somewhat less than 5 feet; the English military pace at the ordinary marching rate is $2\frac{1}{2}$ feet, and at double quick time 3 feet.

PACER, the ambling gait of the pacer, smooth, and lateral, as distinguished from the diagonal gait of the trotter, has been appreciated from the earliest antiquity. The time for a paced mile has gradually been reduced from 2:28, until in 1905 Dan Patch made it in 1:55 $\frac{1}{4}$. The gaits of trotting and pacing are

practically interchangeable, though it is still true that a fast trotter becomes a faster pacer.

PACHA. See Pasha.

PACIFIC OCEAN (formerly called also the South Sea), that immense expanse of water which extends between the North and South American continents and Asia and Australia. It is the largest of the oceans, exceeding in compass the whole of the four continents taken together, and occupying more than a fourth part of the earth's area and fully one-half of its water surface. On the west it extends to the Indian ocean, and has several more or less distinct seas connected with it—the China sea, Yellow sea, Sea of Japan, Sea of Okhotsk, etc.; on the north it communicates with the Arctic ocean by Behring's straits, on the south it is bounded by the Antarctic ocean, and on the east it joins the Atlantic at Cape Horn. Within this enormous circumference it includes the numerous islands composing the groups of Australasia and Polynesia, and those adjoining America and Asia. The average depth of the Pacific appears to

be greater than that of the Atlantic, and its bed more uniform. Recent soundings between the Friendly islands and New Zealand gave depths of from 5022 up to 5155 fathoms (nearly six miles) not far from Kermadec islands. The greatest depth previously known was 4655 fathoms n.e. of Japan. (See Ocean.) In the Pacific the tides never attain the maximum heights for which some parts of the Atlantic and Indian oceans are celebrated. On all the west coast of America the rise of the tide is usually below 10 feet, and only in the Bay of Panama does it vary from 13 to 15 feet. The trade winds of the Pacific are not so regular in their limits as those of the Atlantic, and this irregularity extends over a much wider region in the case of the southeast trade winds than in the case of the northeast. The cause of this is the greater number of islands in the South Pacific ocean, which, especially in the hot season, disturb the uniformity of atmospheric pressure by local condensations. The northeast trade wind remains the whole year through within the northern hemisphere. The southeast trade wind, on the other hand, advances beyond the equator, both in summer and winter, still preserving its original direction. In the region stretching from New Guinea and the Solomon islands southeastward, there are no regular winds. The zones of the two trade winds are separated by regions of calms and of light winds, the limits of which vary of course with the varying limits of these zones. In the Chinese seas the terrible typhoon occasionally rages, and may occur at any season of the year. As to the chief currents of the Pacific see Currents, Marine. The Portuguese were the first Europeans who entered the Pacific, which they did from the east. Balboa, in 1513, discovered it from the summit of the mountains which traverse the Isthmus of Darien. Magellan sailed across it from east to west in 1520-21. Drake, Tasman, Behring, Anson, Byron, Bougainville, Cook, Vancouver, Lapérouse, and others, traversed it in different directions in the 17th and 18th centuries.

PACK-ICE, in the Arctic seas, an immense assemblage of large floating pieces of ice. When the pieces are in contact the pack is said to be closed; when they do not touch, though very near each other, it is said to be open.

PACK-SADDLE, contrivances for the transportation of merchandise or military stores. The pack-saddle in most general use consists of crossed sticks, fastened to saddle-bars of long bearing. In the United States army pack-animals are usually supplied with the aparejo. Ammunition mules are equipped with pack-saddles, specially adapted for the carrying of ammunition boxes, which are placed in such a way as to admit of easy access when the animal is employed in supplying troops in action.

PACKING INDUSTRY, the slaughtering of cattle, sheep, and hogs, and the utilization of their carcasses is an important industry. The best parts of the animals are shipped in refrigerator cars and vessels for consumption as fresh meat to all parts of the world, while other parts are cured, by smoking or

salting. The fatty portions are converted into lard and commercial grease. The bones are converted into glue or fertilizers, and the hoofs and horns are used or sold for other purposes.

The animals are killed, hooked by the nose to an endless chain, passed through scalding vats, and then through an automatically adjusted scraper which deprives them of hair and bristles in a few seconds. The animals are then hoisted, head down, upon an inclined rail and disemboweled, beheaded, washed, trimmed and whirled to the chill-rooms at the rate of twenty a minute. In dressing hogs, about 20 per cent is offal and the rest is used as meat, of which only about 10 per cent is sold as fresh meat. The other parts are cured, usually by pickling in brine for seven or eight weeks, and then smoking for twenty-four hours. The most profitable part of the industry is the manufacture of sausage. The meat used is chiefly trimmings, which are obtained from all parts of the establishment. The meat is chopped, mixed with potato flour and water. Certain spices are added, including sage, pepper, salt, ginger, and mustard. The intestines are used for sausage casings.

One of the most important parts of the pork-packing industry is the manufacture of lard. Two grades of lard are made—leaf lard and steam lard. In the leaf lard of commerce, not only the pure leaf, but all sorts of trimmings from the belly of the animal are used. Steam lard is made from scraps taken from all parts of the animal, particularly from the feet, or even the feet themselves and the head bones.

In dressing cattle, the parts intended to be sold as fresh beef are allowed to cool for forty-eight hours and then shipped. In the canning of fresh beef, inferior meat is used, either poorer grade of cattle or poorer cuts. Since 1891 the whole packing industry has been under vigilant government inspection.

PADDLE-FISH, a large fish allied to the sturgeons, so named from the elongated broad snout with which it stirs up the soft muddy bottom in search of food. It often reaches a length of from 5 to 6 feet. The paddle-fishes are exclusively North American in their distribution, being found in the Mississippi, Ohio, and other great rivers of this continent.

PADDLE-WHEEL, in steam-ships one of the wheels (generally two in number, one placed on each side of the vessel) provided with boards or floats on their circumferences, and driven by the engine for the ship's propulsion through the water. On rivers liable to such obstructions as floating trees, etc., a single paddle-wheel placed at the stern of the vessel is employed. The ship is propelled by the reaction of the water upon the floats. Most power is gained when the floats are vertical, passing through the water perpendicular to the direction of greatest pressure. The paddle-wheel is now almost entirely confined to river-boats; in ocean-going steamers it has given place to the screw.

PADEREWSKI (pă'de-rěf'ske), Ignace Jan., Polish pianist and composer, was born in Poland in 1860. He received his

musical education at Warsaw and Berlin, and was made professor of music in the Conservatory of Music in Warsaw at the age of eighteen. At the age of twenty-four he was made professor in the Conservatory of Strasburg. Later he studied in Vienna and began professional tours. For his three-months season in the United States 1895-96 he received \$200,000. He has made four American tours—in 1891, 1893, 1896, and 1899. His compositions for the piano have become widely known; they include: Prelude and Minuet, Elegie op. 4, Danses, Polonaises.

PAD'UA, a city in Italy, capital of the province of the same name, 22 miles west of Venice. The university, said to have been founded by the Emperor Frederick II. in 1238, was long renowned as the chief seat of law and medicine in Italy; and very many names famous in learning and art are connected with Padua, such as Galileo, Scaliger, Tasso, Giotto, Lippo Lippi, and Donatello. Pop. 82,283. The province of Padua has an area of 854 sq. miles, and pop. of 443,227.

PADU'CAH, a town in M'Cracken co., Kentucky, on the Ohio, not far from the mouth of the Tennessee. Pop. 21,315.

PÆAN, in Greek, a hymn to Apollo or to other deities, or a song in praise of heroes. A pæan was sung, previous to battle, in honor of Ares (Mars), and after a victory, in praise of Apollo.

PÆ'ONY. See Peony.

PAGANT'NI, Niccolo, a celebrated violinist, born in 1784 at Genoa, died at Nice, 1840. His father, who had some knowledge of music, and discerned the talents of his son, put him at a very early age under the best masters (Costa, Rolla, Paer) to learn music, and particularly the violin. With this instrument his progress was so rapid that at the age of nine he was able to perform in public at Genoa. His first engagement was in 1805, at Lucca, where he found a patroness in Princess Eliza, Bonaparte's sister. In 1813 he left Lucca for Milan, and in 1828 visited Vienna. From this period his fame was world-wide. The wonder which he excited was caused not merely by the charm of his execution and his extraordinary skill, but also by his external appearance, which had something weird and even demoniacal in it. After visiting almost all the great towns of Germany he made a musical tour through France and Great Britain, realizing immense gains. His last years were spent at a villa near Parma.

PAGANS, the worshippers of many gods, the heathen; so called by the Christians because after Christianity had become predominant in the towns the ancient polytheistic faith still lingered in the villages (pigi) and country districts.

PAGE, Thomas Nelson, American novelist, was born in 1853. His first noteworthy literary effort was *Marse Chan* published in 1884 and incorporated with *Meh Lady* and other stories in *Ole Virginia*. Among those of his other works the following are the best known: *Two Little Confederates*, *Red Rock*, and *Gordon Keith*.

PAGING-MACHINE, a machine for printing consecutive numbers on the pages of a book, bank-notes and cheques, railway-tickets, etc. Several machines of this kind have been invented, all of which consist essentially of a number of revolving discs bearing the ten digits in raised figures on their circumference, with various contrivances for making the first disc describe one-tenth of a revolution after every figure is printed, for making the second disc describe one-tenth of a revolution, every time the first makes a complete revolution, and so on, as well as for supplying the figures with ink at each impression. Provision is also made for the printing of duplicate and alternate numbers if this is required.

PAGO'DA, the name given to Hindu and Buddhist temples. The temple proper is generally of pyramidal form, and of a number of stories, of great size



Great Pagoda at Bhuvaneswar, Orissa, India.—Fergusson.

and height, and embellished with extraordinary splendor. Connected with it may be various other structures, open courts, etc., the whole forming architecturally a very imposing group. Pagodas are numerous not only in Hindustan but also in Burmah, Siam, and China. The statues in the temple are often of a colossal size.

PAHANG', a state on the east coast of the Malay Peninsula; area, 10,000 sq. miles; pop. 83,419. By the treaty concluded between Great Britain and the Sultan of Pahang in 1888 the control of the foreign relations of that state was conveyed to the government of the Straits Settlements; and Pahang is now practically a dependency of that colony.

PAHLANPUR, or **PALANPUR**, a town in India, presidency of Bombay, province of Gujerat. Pop. of town, 17,799; of agency, 467,691.

PAIN, an uneasy sensation of body, resulting from particular impressions made on the extremities of the nerves transmitted to the brain. Physical pain may be produced by various causes—by injuries to the organs in which the pain is localized; by a peculiar state of the brain and nerves; or by the sympathetic affection of an organ at some distance from that which has been injured. It is often of great service in aiding the physician at arriving at a correct diagnosis of a disease, and still more obviously in frequently being the only

intimation which a patient has of the fact of there being a disease which demands a remedy. The degree of pain, however, is rarely in direct proportion to the gravity of a disease, and is often altogether absent when there are other symptoms of a serious malady.

PAINE, Robert Treat, an American patriot, was born in 1731 in Boston, Mass. He was a delegate in 1768 to a convention called by prominent citizens after Governor Bernard had dissolved the legislature for refusing to rescind its circular letter to the other colonies, and in 1770 he managed, in the absence of the attorney-general, the prosecution of Captain Preston and his men for firing upon the citizens on March 5th. In 1773-74 he was a member of the Massachusetts assembly; was one of the representatives of Massachusetts in the continental congress from 1774 to 1778; and was a signer of the declaration of independence. He was one of the founders (1780) of the American Academy of Arts and Sciences. He died in 1814.

PAINE, Thomas, political and deistical writer, born in 1737 at Thetford in Norfolk. In 1774 emigrated to America, with a letter of introduction from Franklin. Paine threw himself heart and soul into the cause of the colonists, and his pamphlet entitled *Common Sense*, written to recommend the separation of the colonies from Great Britain, and his subsequent periodica called the *Crisis*, gave him a title to be considered one of the founders of American independence. In 1787 he returned to England, and in answer to Burke's *Reflections* on the French Revolution wrote his *Rights of Man*. A prosecution was commenced against him as the author of that work, but while the trial was pending he was chosen member of the national convention for the department of Calais, and, making his escape, set off for France, where his *Rights of Man* had gained him



great popularity, and arrived there in September, 1792. On the trial of Louis XVI. he voted against the sentence of death, proposed his imprisonment during the war and his banishment afterward. This conduct offended the Jacobins, and toward the close of 1793 he was excluded from the convention, arrested, and committed to prison, where he lay for ten months, escaping the guillotine by an accident. Just before his confinement he had finished the first part of his work against revelation,

entitled the *Age of Reason*; it was published in London and Paris in 1794, by which step he forfeited the countenance of the greater part of his American connections. He remained in France till August, 1802, when he embarked for America, where he spent the remainder of his life, occupied with financial questions and mechanical inventions. He died at New York in 1809.

PAINTER'S COLIC. See Lead-Poisoning.

PAINTING is the art of representing the external facts of and objects in nature by means of color. A study of the art requires a knowledge of form, animate and inanimate; of perspective; and of light and shade. Considered in relation to the subjects treated, painting may be divided into decorative, historical, portrait, genre (scenes of common or domestic life), landscape with seascape, architectural, still life. According to the methods employed in the practice of the art it is termed oil, water-color, fresco, tempera or distemper, and enamel painting, and in mosaics, on glass, porcelain, terra-cotta, and ivory (this last being called miniature-painting.) Decorative works, usually in fresco or tempera, but sometimes in oil, are generally executed upon the parts of a building. For the basis of easel pictures, wood-panels prepared with a coating of size and white were used solely up to the 14th century for both oil and tempera, and are still sparingly employed; but canvas covered with a priming of size and white-lead, and tightly nailed over a wooden frame called a "stretcher," is now almost universally adopted for oil-painting. For water-colors paper alone is employed. The tools used by an artist are charcoal, colored crayons, and lead-pencils for outline purposes; colors, a palette for holding the same, a palette-knife for mixing them; brushes for laying them on; and an easel with adjustable heights for holding the canvas. A wooden mannikin, with movable joints, and termed a "lay-figure," is sometimes used on which to arrange costumes and draperies.

The term "oil-colors" is employed to denominate colors ground with oil, and water-colors those wherein gum and glycerine have been employed. Both are ground solid, an oil medium being used in the first case and water in the second to thin out the colors when on the palette. Fresco-painting is executed on wet plaster. Mosaic work is formed by small cubes of colored glass, called tesserae, fixed in cement; in tempera the colors are mixed with white; in encaustic, wax is the medium employed; and in enamel the colors are fired. Egyptian, Greek, and early Roman paintings were executed in tempera; Byzantine art found its chief expression in mosaics, though tempera panels were executed; and early Christian art up to and partly including the 14th century adopted this last method. The vehicle employed in mixing the colors was a mixture of gum and white of egg, or the expressed juice of fig-tree shoots. The introduction of oil-painting was long attributed to the Van Eycks of Bruges (circa 1380-1441), but painting in oil is known to have

been practiced at a much earlier period, and it is now generally held that the invention of the Van Eycks was the discovery of a drying vehicle with which to mix or thin their colors, in place of the slow-drying oil previously in use. This new vehicle was composed of a thickened linseed-oil mixed with a resinous varnish, and it was its introduction that effected so great a revolution in the art of painting. For an account of special methods of painting see articles Fresco-painting, Mosaic, Encaustic Tiles, Enamel, etc.

PAINTING ON GLASS. See Glass-painting.

PAINTS. See Pigments.

PAISLEY, a municipal and parliamentary burgh of Scotland, in the county of Renfrew. Paisley has been long noted for its manufactures, especially of textile goods. The shawl manufacture, introduced about the beginning of the 19th century, and long a flourishing industry, is not now a staple, but the textile manufacture is still large, though the chief industry is that of sewing cotton, for which Paisley is celebrated all over the world. Among the other manufactures are tapestry, embroidery, tartans, and carpets. Pop. 79,355.

PAL'ADIN, a term originally applied to the Count of the Palace, or Count Palatine, the official who superintended the household of the Carolingian sovereigns, and then to the companions in arms of Charlemagne, who belonged to his court. Latterly it was used in a more general sense.

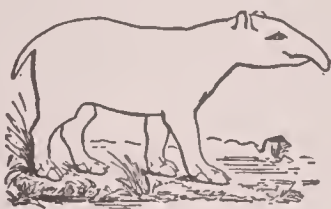
PALÆARCTIC REGION, in zoology, one of six divisions of the world based upon their characteristic fauna. It embraces Europe, Northern Asia, and Africa north of the Atlas range.

PALÆOGRAPHY, is the science by means of which ancient inscriptions, and the writings and figures on ancient monuments, are deciphered and explained; as distinguished from diplomatics, which deals with written documents.

PALÆONTOLOGY is the science which treats of the living beings, whether animal or vegetable, that have inhabited the globe in the successive periods of its past history. The comparison of the fossil remains of plants and animals, belonging for the most part to extinct species, has given a powerful impulse to the science of comparative anatomy, and through it a truer insight has been obtained into the natural arrangement and subdivision of the classes of animals. But the science which has profited in the highest degree from palæontology is geology. Palæontology, apart from its importance as treating of the past life-history of the earth, assists the geologist in his determination of the chronological succession of the materials composing the earth's crust. As a general result of united geological and palæontological researches, it has been found possible to divide the entire series of stratified deposits into a number of rock-systems or formations, each of which is defined by possessing an assemblage of organic remains which are not associated in any other formation. These systems as a whole are divided into three great

divisions, based on the characters of their organic remains, and thus representing three successive life-periods, as follows: Palæozoic, or ancient life epoch, which includes the Laurentian, Cambrian, Silurian, Devonian, Old Red Sandstone, Carboniferous, and Permian rock systems. Mesozoic, or middle life epoch, including the Triassic, Jurassic or Oolitic, and Cretaceous rock systems. Cainozoic, or recent life epoch, which comprises the Eocene, Miocene, Pliocene, and Post-tertiary rock systems. The fossil remains of the first two divisions mostly belong to extinct species. The Cainozoic fossils belong mostly to living species or species only recently extinct. See Geology.

PALÆOTHE'RIUM, an extinct genus of Ungulate or Hoofed Quadrupeds with three toes. These animals resembled tapirs, and varied in size from a sheep



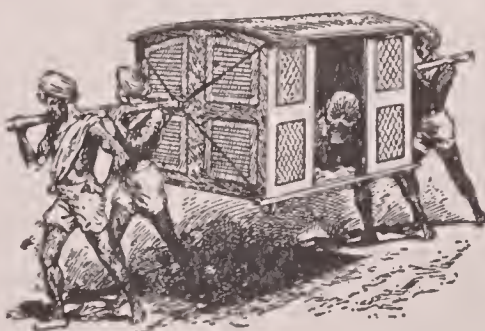
Palæotherium restored.

to a horse. They had twenty-two teeth in each jaw, and, in all probability, a short mobile snout or proboscis. This genus forms the type of the family Palæotheridæ, which occur as fossils in Eocene and Miocene strata.

PALÆOZOIC. See Palæontology.

PALAIS-ROYAL (pâ-lâ-rwâ-yâl), a popular resort of the Parisians, originally a royal palace as the name implies. The original palace was built (1629-36) by Richelieu, and by him presented to Louis XIII. It was confiscated by the republicans in 1793, and the Tribunal sat in the palace during the Reign of Terror. At the Restoration it was repurchased by the Duke of Orleans, but in the revolution of 1848 it was again appropriated to the state. In 1871 it was set on fire by the Communists, but has since been restored. The Théâtre Français and several shops now form parts of the buildings of the Palais-Royal.

PALANQUIN, PALANKEEN (pal-an-kên'), a covered conveyance used in India, China, etc., borne by poles on the



Palanquin.

shoulders of men, and in which a single person is carried from place to place. The palanquin proper is a sort of box about 8 feet long, 4 feet wide, and as

much in height, with wooden shutters on the venetian-blind principle. It is used to be a very common conveyance in India, especially among the Europeans, but the introduction of railways and the improvement of the roads have almost caused its discontinuance.

PAL'ATE, the name applied to the roof of the mouth. It consists of two portions, the hard palate in front, the soft palate behind. The former is bounded above by the palatal bones, in front and at the sides by the alveolar arches and gums, being lined by mucus membrane; behind it is continuous with the soft palate. It supports the tongue in eating, speaking, and swallowing. The soft palate is a movable fold suspended from the posterior border of the hard palate. It consists of mucous membranes, nerves, and muscles, and forms a sort of partition between the mouth and the hinder nostrils. Its upper border is attached to the posterior margin of the hard palate; its lower border is free. The uvula hangs from the middle of its lower border, and on each side are two curved folds of mucous membrane called the arches or pillars of the soft palate. Between these on either side of the pharynx are the two glandular bodies known as tonsils. The upper surface of the soft palate is convex, the lower surface is concave with a median ridge, the latter pointing to the early or embryo stage of its formation, when it consists of two distinct parts. Non-union of these halves and of those of the hard palate constitutes the deformity known as cleft palate, often associated with hare-lip. Glands are abundant in the soft palate, secreting the mucus which serves to lubricate the throat during the passage of food. The soft palate comes into action in swallowing, and also in speaking, being of great importance in the utterance of certain sounds. The special use of the uvula is not well known. It is often relaxed or enlarged, causing a troublesome cough.

PALAT'INATE, a division of the old German Empire, under the rule of counts-palatine, consisting of two separate portions distinguished as the Upper and Lower Palatinate. The Upper or Bavarian Palatinate was bounded mainly by Bohemia and Bavaria, and its capital was Amberg. The Lower or Rhenish Palatinate lay on both sides of the Rhine, surrounded by Baden, Alsace-Lorraine, etc., its chief towns being Heidelberg and Mannheim. The counts-palatine were in possession of the Palatinate and the districts belonging to it as early as the 11th century, and were long among the most powerful princes of the German Empire. At the peace of Westphalia (1648) the Lower Palatinate was separated from the Upper, Bavaria getting the latter, while the former now became a separate electorate of the empire, and was henceforth generally known as the Palatinate. By the treaties of Paris (1814-15) the Palatinate was split up; Bavaria received the largest part, and the remainder was divided between Hesse-Darmstadt and Prussia. The name Palatinate now belongs to the detached portion of Bavaria on the west of the Rhine, while the Upper Palatinate forms

another portion of the monarchy. See Bavaria.

PALATINE. See Palatinate and Count Palatine.

PALATINE HILL. See Rome.

PALE, in heraldry, the first and simplest kind of ordinary. It is bounded by



A pale azure.

two vertical lines at equal distances from the sides of the escutcheon, of which it incloses one-third.

PALEN'CIA, a town of Spain in Leon, capital of a province of same name. Pop. 16,118.—The province of Palencia is fertile and watered by the Carrion and Pisuerga. Area, 3128 sq. miles; pop. 192,473.

PALER'MO, a seaport town, the capital of Sicily, beautifully situated on the north side of the island. The city is ornamented by numerous fountains, and has many public edifices, including a cathedral of the 10th century which contains monuments in porphyry of the Emperor Frederick II. and King Roger the Norman. The manufactures consist chiefly of silks, cottons, oil-cloth, leather, glass, and gloves. The principal exports are sumach, wine and spirits, fruits, sulphur, skins, oil, essences, cream of tartar, liquorice, and manna; imports, colonial produce, woolen, cotton and silk tissues, hardware, earthenware, etc. The fisheries are very productive, and give employment to nearly 40,000 hands. Pop. 310,352.—The province of Palermo contains an area of 1963 sq. miles. Pop. 785,016.

PAL'ESTINE, Antique, or the **HOLY LAND**, a maritime country of Asiatic Turkey, in the southwest of Syria, having on the north the mountains of Lebanon and Anti-Lebanon, east the Arabian Desert, south Arabia, and west the Mediterranean; length, north to south, about 140 miles; breadth, about 80 miles; area, nearly 10,000 sq. miles (or one-third the size of Scotland). The coast has no indentations except the Bay of Acre in the north. The chief feature of the interior, besides its generally irregular character, is the deep valley of the Jordan, a river which intersects the country from north to south, and connects three lakes, the Dead Sea, Lake of Gennesaret, and Lake Merom. The surface is generally mountainous, or consists of a series of plateaux, both on the west and the east of the valley of the Jordan. With the exception of Mount Hermon in the north (9050 feet) few of the heights exceed 3000 feet. The most remarkable are Carmel, on the southwest side of the Bay of Acre; Jebel Tur (Tabor), farther inland; Ebal and Gerizim, about the middle of the country; Zion, Moriah, and the Mount of Olives, in and near Jerusalem. Palestine has comparatively few plains, though in few countries is there such endless variety of valley as to size, shape, color, and fertility. The maritime or coast plains of Sharon and Philistia

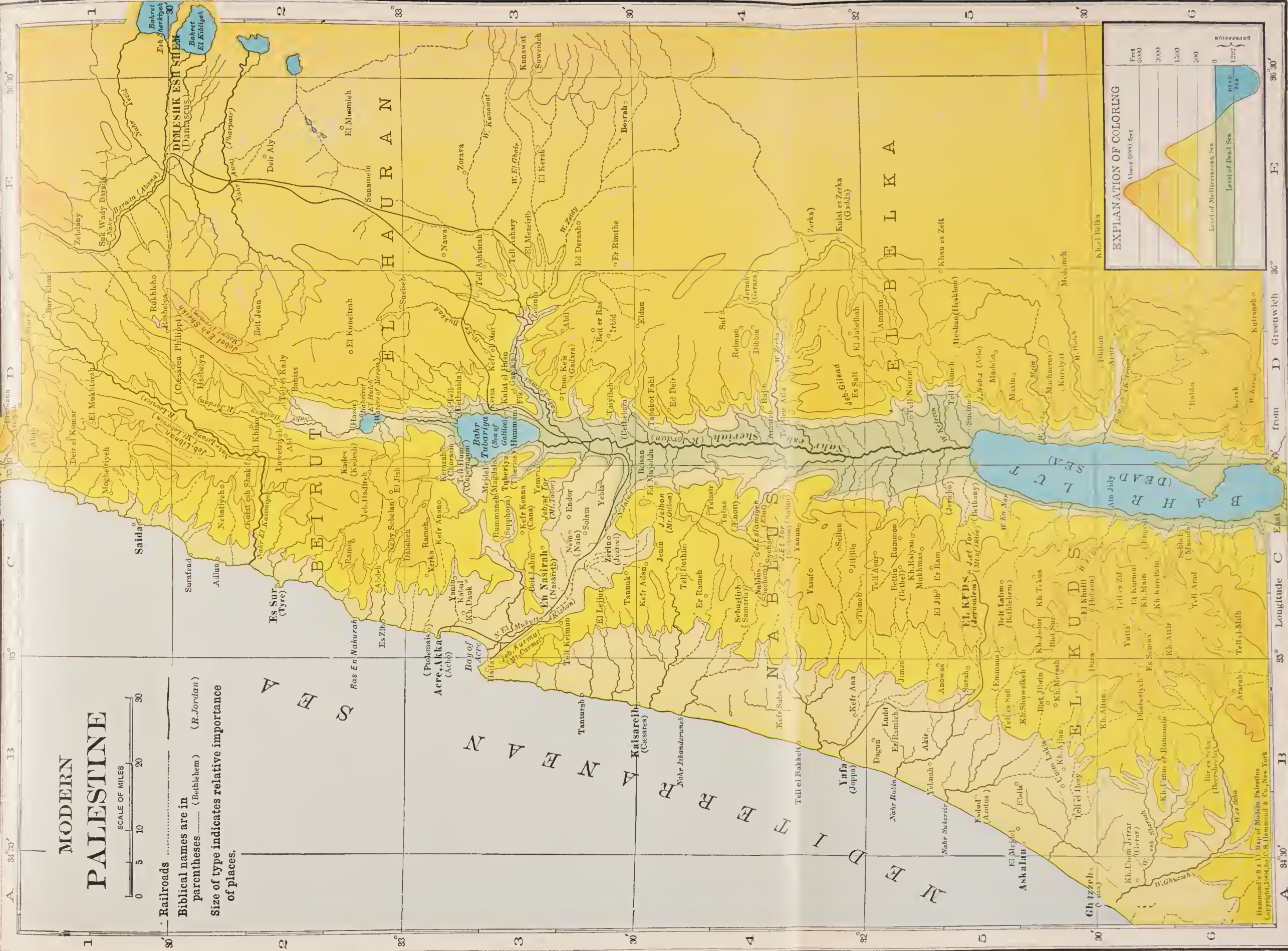
the river plain of Jordan, and the plain of Esdraelon in the north, are all that are worthy of mention. The maritime plains are well peopled and cultivated. The Jordan plain is nearly a waste of sand. The plain of Esdraelon or valley of Jezreel is of great fertility. The principal river is the Jordan (which see). This river has a length of 200 miles, including windings, but its direct course is only about 70. Its course from Merom to the Dead Sea is mostly below the sea-level. Most of the so-called rivers of Palestine are merely winter torrents which run dry in summer. Of the few permanent rivers emptying into the Mediterranean, the most important are the Kishon, which drains the plain of Esdraelon; and the Aujeh farther south. The chief tributary of the Jordan is the Zerka or Jabbok. The most remarkable lake is the Dead Sea (which see), 46 miles long, 9 or 10 broad, and about 1292 feet below the Mediterranean. The other lakes are Bahr-el-Huleh (Merom), 5 miles long and 4 miles broad, about 6 feet above the Mediterranean; and Lake Gennesaret or the Sea of Galilee, 682 feet below it, 12½ miles long, 7½ broad. In Palestine the wells and springs are numerous, and are all counted worthy of note. Among the most interesting are the springs of hot water which issue forth on both sides of the Jordan Valley. Of these there are five or six with a temperature varying from 109° to 144° F. As regards geology the chief rock formation of the country on both sides of the Jordan is limestone, full of caves. Sandstone also occurs, with basalt and other volcanic rocks, the latter being especially common on the east side of Jordan. Signs of volcanic action are abundant, and earthquakes are still common. The year may be divided into two seasons, summer and winter. During the former, which lasts from April to November, little or no rain falls; during the latter there is a considerable fall of rain, the annual average at Jerusalem being about 60 inches. In the Jordan valley and along the Mediterranean lowlands the summer heat is apt to be oppressive. During the winter the ground is seldom, if ever, frozen except on the higher elevations. Palestine was once very fertile and were the same attention paid, as formerly, to artificial irrigation, and the construction of reservoirs and water-courses, it might be so again. Among the products, besides the usual cereals, are grapes, figs, olives, oranges, and apricots. The flora of Palestine is rich in flowering plants, including the scarlet anemone, ranunculus, narcissus, crocus, pheasants eye, etc. The country was once well timbered, but it is now, as a whole, bare and desolate, though forests of pine and oak exist on the east of the Jordan. On the west side of the river, however, there are few trees. The most common tree is the oak, including the prickly evergreen oak and two deciduous species. Other trees are the olive, palm, oleander, sycamore, walnut, ash, cedar. The wild animals include the leopard, hyæna, bear, wolf, jackal, boar, antelope, gazelle, porcupine, coney, jerboa, etc. The domestic animals of burden are the ass, mule, and

camel, the horse being little used. The cattle are not generally very numerous. Sheep and goats are abundant. Among the birds are eagles, vultures, hawks—birds of prey being very numerous—ravens, bee-eaters, hoopoes, storks, and nightingales. Fish abound in the Sea of Galilee and the Jordan. There are many species of reptiles, among them being the chamæleon, land and water tortoise, lizards, and serpents, and even the crocodile.

The name Palestine, from the Hebrew Pelescheth, means the land of the Philistines. It is properly only applicable to the southwest part of the country. The ancient name of the country was Canaan and when thus named, in the time of the patriarchs, it was parcelled out among a number of independent tribes, all probably Semitic. In the time of Moses the district east of the Jordan was taken and divided among the tribes of Reuben and Gad, and the half-tribe of Manasseh; and latterly the whole territory was apportioned among the twelve Jewish tribes. For the subsequent history see the article Jews. In the time of our Saviour Palestine was held by the Romans, and divided into the four provinces of Galilee, Samaria, Judea, and Perea. In 606 Palestine was taken by the Saracens under Omar. The severities exercised toward Christians gave rise to the Crusades, but Mohammedanism prevailed, and the country sank into a degraded state. The sultan of Egypt ruled it till 1517, when it was incorporated with the Turkish Empire.

It is only within a comparatively recent period that the exploration of Palestine has been carried out systematically and with some attempt at thoroughness, though much yet remains to be done. The most valuable results have been those achieved under the direction of the "Palestine Exploration Fund," a society organized in 1865 for the purpose of making an exhaustive exploration and an exact survey of the Holy Land. In 1870 the American Palestine Exploration society was organized, and it was agreed that the English society should confine itself to the western side of the Jordan, and the American society to the eastern. The triangulation of Western Palestine was begun in 1871 and finished in 1877. A large and detailed map of the country has been published and an immense mass of valuable information regarding topography, natural history, etc., accumulated. The present population of the country is estimated at 650,000, the Arab element being probably the prevailing one, and the Arabic language generally in use. The people consist partly of the fellahin or settled cultivators, artisans, etc.; partly of the nomad Bedouin, who live by rearing cattle or by less reputable means. The country exports some grain, olive-oil, oranges, etc. Jaffa and Acre are the chief ports, Jerusalem (connected by the railway with Jaffa) and Nablus the largest towns. See also Jerusalem, Crusades, etc.

PALEY, William, English theological and philosophical writer, was born at Peterborough in 1743, died 1805. His chief works are: *The Principles of Moral and Political Philosophy* (1785); *Horæ*



MODERN PALESTINE

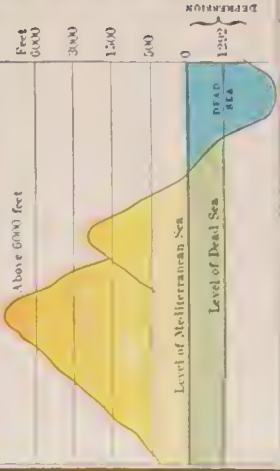
SCALE OF MILES
0 5 10 20 30

Railroads

Biblical names are in parentheses (Bethlehem) (R. Jordan)

Size of type indicates relative importance of places.

EXPLANATION OF COLORING



Paulinæ (1790); A View of the Evidences of Christianity (1794); Natural theology or Evidences of the Existence and Attributes of the Deity collected from the Appearance of Nature (1802). As a writer he had little claim to originality but was distinguished by clearness and cogency of reasoning, lucidity of arrangement, and force of illustration. His system of moral philosophy is founded purely on utilitarianism.

PAL'IMSEST, a manuscript prepared by erasure for being written on again, especially a parchment so prepared by washing or scraping. This custom was brought about by the costliness of writing materials, and was practiced both by the Greeks and Romans, and in the monasteries, especially from the 7th to the 13th centuries. That which replaced the ancient manuscripts was nearly always some writing of an ecclesiastical character. The parchments which have been scraped are nearly indecipherable. Those which have been washed have often been revived by chemical processes. Fragments of the Iliad and extensive portions of many Greek and Roman writers have been recovered by these means.

PALISADE, a fence or fortification consisting of a row of strong stakes or posts set firmly in the ground, either perpendicularly or obliquely, for the greater security of a position, and particularly for the closing up of some passage or the protection of any exposed point.

PALISSY, Bernard, a French artist and philosopher, born about 1510. He was apprenticed in a glass-work at Agen, where he learned the art of painting on glass. After sixteen years of unremunerated labor (1538-54), he obtained a pure white enamel, affording a perfect ground for the application of decorative art, and his enamelled pottery and sculptures in clay became recognized as works of art. He suffered persecution as a Huguenot, and was arrested in 1589 and thrown into the Bastille, where he is said to have died in 1590. He left several philosophical works.

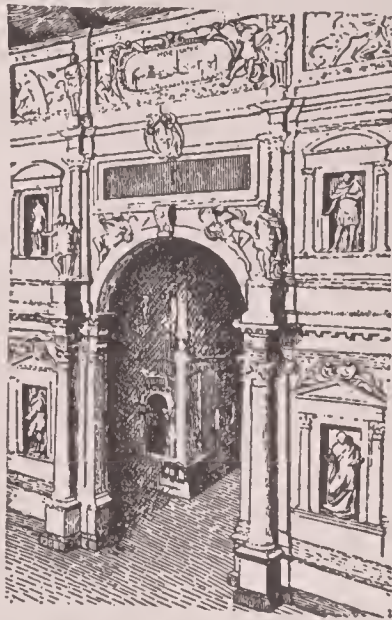
PALISSY-WARE, a peculiar kind of French art pottery invented by Bernard Palissy. The surface is covered with a jasper-like white enamel, upon which animals, insects, and plants are represented in their natural forms and colors. Specimens of this ware are much valued and sought after by collectors.

PALLADIAN ARCHITECTURE, a species of Italian architecture founded upon the Roman antique as interpreted by the writings of Vitruvius, but rather upon the secular buildings of the Romans than upon their temples. It is consequently more applicable to palaces and civic buildings than to churches. A characteristic feature of the style is the use of engaged columns in façades, a single range of these often running through the two principal stories. It was introduced into England by Inigo Jones, a follower of the Venetian school of Palladio.

PALLADIUM, a metal discovered by Wollaston in 1803, and found in small quantity associated with native gold and platinum. It presents a great general

resemblance to platinum, but is harder, lighter, and more easily oxidized. It is useful on account of its hardness, lightness, and resistance to tarnish, in the construction of philosophical instruments.

PALLAS, of the minor planets revolving round the sun between Mars and Jupiter, that whose orbit is most



Palladian architecture.—Teatro Olimpico, Vicenza, Italy.

inclined to the ecliptic. It was discovered in 1802 by Olbers at Bremen. It revolves round the sun in 4.61 years; diameter 172 miles.

PALLAS ATHENE, the Greek goddess of wisdom, subsequently identified with the Roman Minerva. See Athena.

PALLISER, Sir William, born in Dublin 1830. He was the inventor of projectiles and guns which bear his name, and was the author of many improvements in fortifications, etc. He was knighted in 1873 and died in 1882.

PALM, the tree. See Palms.

PALMA, an episcopal city of Spain, capital of the Island of Majorca, 130 miles south of Barcelona. Pop. 63,937.

PALMA, La, the most northwesterly of the Canary Islands; area, 224 sq. miles; capital, Santa Cruz de la Palma, the principal port. Pop. 38,822.

PALMA CHRISTI, a name frequently applied to the castor-oil plant.

PALMER, John McAuley, American soldier and political leader, was born at Eagle Creek, Scott co., Ky., in 1817. He removed to Illinois, and was admitted to the bar in 1840. He served in the state senate, and in 1860 was a republican presidential elector. In April, 1861, he was appointed colonel of an Illinois volunteer regiment, served at Island No. 10, Stone river, and Chickamauga, and was promoted major-general of volunteers. He led the fourteenth army corps through the Atlanta campaign, May till September, 1864. From 1870 until 1873 he served as governor of Illinois. In 1890 he was elected United States senator, and in 1896 accepted the nomination for president from the gold democrats. He died in 1900.

PALMER, Ray, American clergyman and hymn-writer, was born at Little Compton, R. I., in 1808. He was called to the pastorate of the Central Congregational church, Bath, Maine, in 1835. In 1866 he relinquished pastoral work and became secretary of the American Congregational Union at New York. He is chiefly remembered as a writer of hymns, one of which—My faith looks up to Thee—exists in twenty different languages. He died in 1887.

PALMERSTON (pā'mēr-stun), Henry John Temple, Viscount, English statesman, was born in Westminster 1784, died 1865. In 1802 he succeeded his father in the title (an Irish one). In 1807 he was returned as member for Newport, I. of Wight, and became junior lord of the admiralty in the Duke of Portland's administration. In 1809 he became secretary of war, and two years later he was elected member for Cambridge university. He was a supporter of Catholic emancipation, and retired from office in the Wellington ministry in 1828 with others of the Canning party. He had already made a reputation for his command of foreign policy, and in 1830 he was made foreign secretary in the whig ministry of Earl Grey. From this time he continued to be a member and leader of the liberal party. In 1831 he was returned for Bletchingley, and after the reform bill (1832) for South Hants. He retired from office in December, 1834, but in April, 1835, he resumed his former appointment under Lord Melbourne. He continued in office as foreign secretary until 1841. It was during this period that he gained his great reputation for vigilance and energy in the conduct of foreign affairs. In 1845 he supported the repeal of the



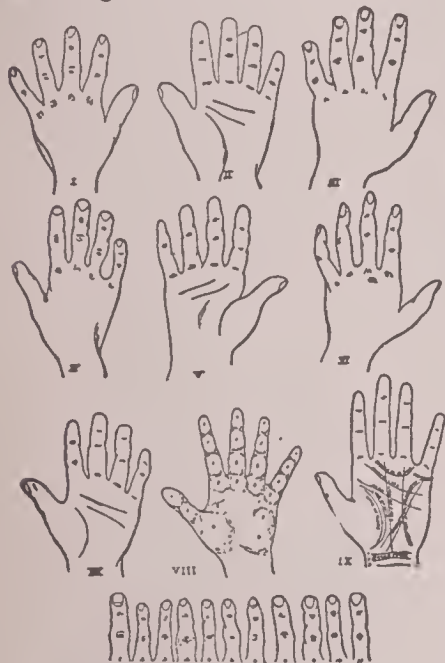
Viscount Palmerston.

corn-laws, and in 1846 he was foreign secretary in the Russell ministry. Several causes of dissatisfaction, the chief being his recognition of Louis Napoleon without consulting his colleagues, led to Palmerston's resignation in December, 1851. In February, 1852, he became home secretary in the coalition ministry of Lord Aberdeen. On the resignation of this ministry he became prime minister, which position he held, with a brief interruption, for the remainder of his life.

PALMETTO PALM, a common name of several palms, especially of the cabbage-palm, which grows in the West

Indies and in the southern states of North America. It attains the height of 40 or 50 feet, and is crowned with a tuft of large leaves. It produces useful timber, and the leaves are made into hats, mats, etc.

PALMISTRY, a pseudo-science, the professors of which claim that the mental traits of an individual are indicated by the shape, markings, and other characters of the hand. The more ardent advocates of palmistry hold that the future of the individual can be "read" in this way. Palmistry is a very ancient science and may have some real basis of fact under it, although the respectability attaching to it thus far has been very dubious. Palmistry, like astrology, has a very complex system of ideas and a difficult nomenclature into which it is impossible more than barely to enter here. The drawing shows different types of hand, the types, in the numbered order being the "bilious" hand, indicating brute instinct rather than reason; the "square" or stubborn hand; the "spatulate" or energetic hand; the philosophic hand; the artistic, the idealistic, and the diplomatic hand. Figure 9 shows the principal lines of the palm. The row of fingers from No. 1 to No. 11 may



Traits of the hand.

be described as follows: Large fingers, indicating a vulgar and cruel disposition; small, thin fingers, a keen, active mind; long, thin fingers, love of detail; fat fingers, sensuality; smooth fingers, artistic ability; knotty fingers, truthfulness and good business ability; pointed fingers, enthusiasm; square fingers, strong-mindedness; spatulate fingers, positiveness; mixed fingers, adaptability; obtuse fingers, coarseness.

PALMITIC ACID, a fatty acid occurring in many fats, whether of the animal or vegetable kingdom, such as palm-oil, butter, tallow, lard, etc., and existing partly in a free state but generally in combination with glycerin (as a glyceride).

PALM-OIL, a fatty substance obtained from several species of palms,

but chiefly from the fruit of the oil-palm, a native of the west coast of Africa. This tree grows to the height of 80 feet, bears a tuft of large pinnate leaves, and has a thick stem covered with the stumps of the stalks of dead leaves. The fruits, which are borne in dense clusters, are about 1½ inches long by 1 inch in diameter, and the oil is ob-



Palm-oil tree.

tained from their fleshy covering. In cold countries it acquires the consistence of butter, and is of an orange-yellow color. It is employed in the manufacture of soap and candles, for lubricating machinery. By the natives of the Gold Coast this oil is used as butter; and when eaten fresh is a wholesome and delicate article of diet. It is called also Palm-butter.

PALMS, the *Palmaceæ*, a nat. order of arborescent endogens, chiefly inhabiting the tropics, distinguished by their fleshy, colorless, six-parted flowers, inclosed within spathes; their minute embryo lying in the midst of albumen, and remote from the hilum; and their rigid, plaited or pinnated leaves, sometimes called fronds. The palms are among the most interesting plants in the vegetable kingdom, from their beauty, variety, and associations, as well as from their great value to mankind. While some have trunks as slender as the reed, or longer than the longest cable (500 feet), others have stems 3 and even 5 feet thick; while some are of low growth, others exhibit a stem towering from 160 to 190 feet high, as wax-palm of South America. About 600 species are known, but it is probable that many are still undescribed. Wine, oil, wax, flour, sugar, sago, etc., are the produce of palms;

to which may be added thread, utensils, weapons, and materials for building houses, boats, etc. There is scarcely a single species in which some useful property is not found. The cocoanut, the date, and others are valued for their fruit; the cabbage-palm, for its edible terminal buds; the fan-palm, and many more, are valued for their foliage, whose hardness and durability render it an excellent material for thatching; the sweet juice of the Palmyra and others, when fermented, yields wine; the center of the sago-palm abounds in nutritive starch; the trunk of the wax-palm exudes a valuable wax; oil is expressed in abundance from the oil-palm; many of the species contain so hard a kind of fibrous matter that it is used instead of needles, or so tough that it is manufactured into cordage; and, finally, their trunks are in some cases valued for their strength, and used as timber, or for their elasticity or flexibility.

PALM SUNDAY, the last Sunday before Easter, on which Christ's entry into Jerusalem, when palm branches were strewed before him, is celebrated. It is still celebrated with much solemnity by the Roman Catholics, and branches are strewed in the churches.

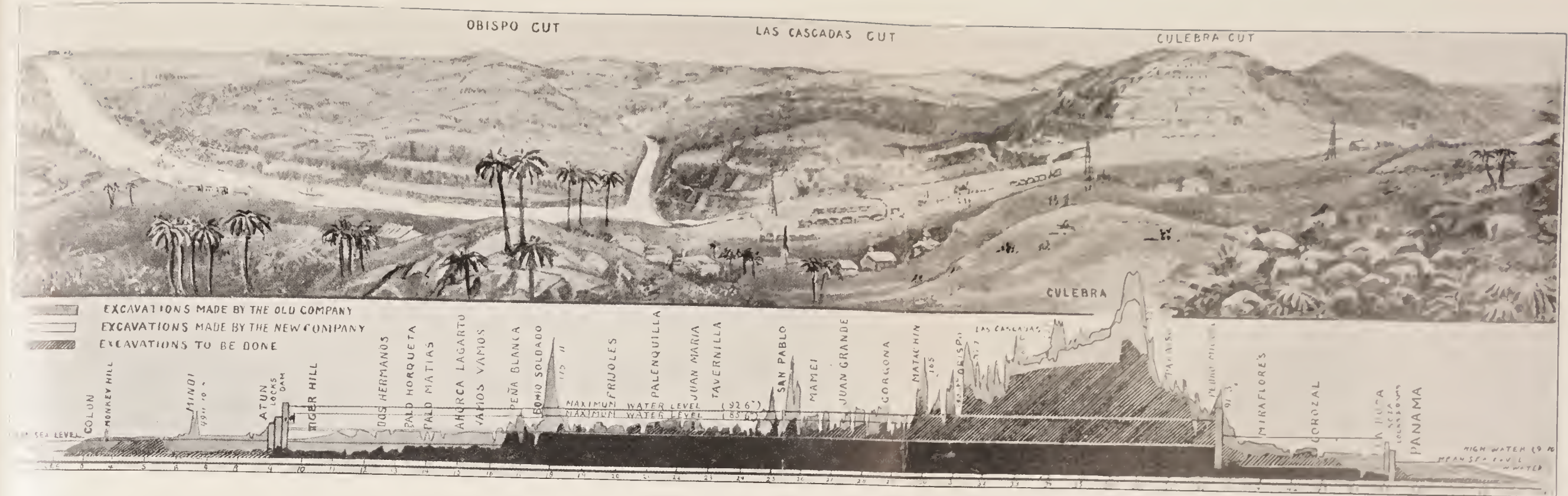
PALMYRA PALM, the common Indian palm, a tree ranging from the northeastern parts of Arabia through India to the Bay of Bengal. In India and other parts of Asia it forms the chief support of 6,000,000 or 7,000,000 of population. Its fruit is a valuable food, its timber is excellent, and it furnishes thatch, cordage, and material for hats, fans, umbrellas, etc. It produces sugar and arrack, and its leaves are used for writing-tablets. The young shoots are boiled and eaten, the seeds are edible, and the fruit yields a useful oil. A full-grown palmyra is



Palmyra palm.

from 60 to 70 feet high, and its leaves are very large.

PALPITATION consists of repeated attacks of violent and spasmodic action of the heart. When palpitation arises from organic lesion of the heart it is called symptomatic; when it is caused by other disorders disturbing the heart's action it is called functional. Disor-



VIEW OF THE PANAMA CANAL CUT THROUGH CONTINENTAL DIVIDE.

The earth and rock to be removed would leave a trench 387 feet, the width (100 feet) and the length (7 miles) of the thoroughfare. At the bottom is shown the profile of the canal from entrance to channel in Limon Bay on the Atlantic Ocean to deep water in Panama Bay, 49.72 miles. The canal will be on sea level to Gatun where triple locks will lift the vessel 85 feet above mean tide. On this level, vessels will steam 31 miles to 30-foot lock at Pedro Miguel; thence on 55-foot level for a distance of 5 miles to double locks at Sosa, where sea level will be regained, a 5-mile channel leading through coral shoals.

ders which may cause palpitation include nervous affections, anæmia, chlorosis, protracted mental emotion, excessive use of stimulants, etc.

PALSY, paralysis, especially a local or less serious form of it. See Paralysis.

PAMPAS, a name given to the vast treeless plains of South America in the Argentine Republic, Paraguay, and Uruguay. The pampas are generally covered with grass and other herbage, and in many parts with gigantic thistles, but with the heat of summer the vegetation is much burned up. Shallow lakes or swamps occur in some parts, and parts have the character of a salt steppe. The pampas are roamed over by various tribes of Indians, as well as by herds of wild horses and cattle. In many parts there are now cattle ranches, and large flocks of sheep are also reared.

PAMPAS-GRASS, a grass which grows in the pampas in the southern parts of South America. It has panicles of silvery flowers on stalks more than 10 feet high, and its leaves are from 6 to 8 feet long. The male and female flowers are on separate stalks.

PAN, a rural divinity of ancient Greece, the god of flocks and herds, represented as old, with two horns, pointed ears, a goat's beard, goat's tail and goat's feet. The worship of Pan was well established particularly in Arcadia. Pan invented the syrinx or pandean pipes. From him comes the expression panic fear, because he was believed to cause sudden and often inexplicable terror.

PANAMA, a town of the Republic of Colombia, capital of the department of the same name, on the Gulf of Panama and on the Pacific coast of the Isthmus of Panama. The city lies on a tongue of land, across which its streets stretch from sea to sea. The harbor is shallow, but affords secure anchorage. Panama is chiefly important as the terminus of the interoceanic railway and also of the Panama canal. The railway, which has been in operation since 1855, runs across the isthmus from Panama to Colon or Aspinwall on the Atlantic, and accommodates a large traffic. Pop. 25,000. The department occupies the Isthmus of Panama. Agriculture and cattle-breeding are the leading industries, but the climate is generally unhealthy. The prosperity of the department depends largely upon its favorable geographical position, which facilitates transit from the Atlantic to the Pacific. Area, 31,890 square miles. Pop. 285,000.

PANAMA CANAL, a canal in process of construction across the Isthmus of Panama to connect the Atlantic and Pacific oceans. The first step to build this canal was the concession to Lieut. Lucien N. B. Wyse given by the government of Colombia, granting to him and his associates the exclusive privilege for 99 years to use the territory of the country for this purpose. Wyse drew Ferdinand de Lesseps into his project and a company was organized in France with de Lesseps as president. Work was begun in 1881 and by 1882 \$6,500,000 had been sunk in the work. The disruption of the plan and the Paris scandals arising out of it are well known. The receivers of the company organized a new concern and in 1899

the United States government appeared in the enterprise. Negotiations begun at that time ended in 1903 with the acquisition by the United States of the company's rights and property for \$40,000,000.

In 1905 a committee of engineers appointed by President Roosevelt recommended that a sea-level canal be built but on recommendation of the president a lock canal was authorized, beginning in the Bay of Limon, a mile northwest of the city of Colon on the Atlantic side, with a channel 500 feet in width and 41 feet in depth at mean tide, running due south to the shore line of Limon bay, at the mouth of the Mindi river. This distance is $4\frac{1}{2}$ miles. Then the canal passes through low and swampy ground in a southerly direction three miles to the town of Gatun, the width for this stretch being 500 feet and the depth 45 feet. At Gatun there is a space between the hills of over 7,000 feet, through which the waters of the Chagres river and its tributaries flow to the sea. This space is buttressed on either side with rocks and hills, and about midway in this space there is a mountain of rock and earth, in which it is proposed to excavate a diversion channel through which the Chagres river will flow during the construction of the earth dam. The plan is to construct this dam across the entire space at a height of 135 feet above sea level and create a lake. Vessels are to be raised to the level of the lake, to be known as Lake Gatun, by three duplicate locks ranging in a flight of steps, each lock being 900 feet interior length, 110 feet wide, 40 feet deep over the miter sills, with a lift in each lock of 23 2-3 feet. These six locks, constructed of a mass of masonry and concrete, will be buried in Gatun hill and founded on rock throughout. Lake Gatun, when created by the construction of this dam, will be 171 square miles in area and will form the summit level of the canal, which will be 85 feet above sea level. The total length of the lake will be 30 miles, of which 23 miles will be navigated by ships crossing the isthmus. Its depth will be about 75 feet in the immediate vicinity of the dam, this being maintained with little reduction to Bohio (a distance of about 10 miles), and thence reducing gradually toward Obispo, where the depth of 45 feet will be obtained with but little excavation, the bed of the river being about 45 feet below the surface of the future lake.

For 15.69 miles above the Gatun locks the deep portion of the lake will have generally a width exceeding half a mile and only a small amount of excavation will be required to provide a navigable channel no where less than 1,000 feet wide at the bottom and 45 feet deep. Farther up the lake as the amount of excavation required to obtain a depth of 45 feet increases, the minimum width of the channel will be decreased, first to 800 feet for a distance of 3.86 miles from San Pablo to Juan Grande, then to 500 feet for 3.73 miles to Obispo, and to 300 feet for 1.55 miles from Obispo to Las Cascades, where the

channel will be further narrowed to 200 feet through the heaviest portion of the great central mass known as Culebra.

For a distance of 4.7 miles through the deep portion of the Culebra cut the channel is to have a bottom width of 200 feet and to have nearly vertical sides below the water line and then will become 300 feet wide for 1.88 miles to the Pedro Miguel locks, where the summit level will end. The duplicate locks at Pedro Miguel will have one lift of 31 feet. Passing the locks the channel will be 500 feet wide for 1.64 miles, then increasing to 1,000 feet or more for the further distance of 3.38 miles to the Sosa locks on the shore of Panama bay. This broad navigation will be in an artificial lake created by three dams, to be subsequently described. There are to be duplicate flights of locks on the west side of Soca hill near La Boca with two lifts of about 31 feet each from ordinary low tide to the level of Lake Sosa. From the Sosa lock to the 7-fathom curve in Panama bay a distance of four miles, the channel is to be 300 feet wide at the bottom and 45 feet deep below mean tide.

The waterway may be summarized with reference to the channel widths as follows:

Width	Length, miles.	Per cent of route.
1,000 feet.....	19.08	38.4
800 feet.....	3.86	7.8
500 feet.....	12.29	24.7
300 feet.....	7.21	14.5
200 feet.....	4.70	9.4
Locks and approaches.....	2.58	5.2
Total	49.72	100.0

The estimated cost of the canal is \$150,000,000.

PANAMA, Isthmus of, formerly called the Isthmus of Darien, has a breadth of from 30 to 70 miles, connects North with South America, and separates the Pacific from the Atlantic. The coast is rocky and lofty along the Caribbean sea, but low and swampy along the Pacific.

PANAMA HATS, hats made from the immature unexpanded leaves of the stemless screw-pine, a native of Central America and Colombia. After special treatment to remove the soft parts of the leaf, the fibre is soaked to render it pliable, and the weaving is done under water. The hats most valued are those made from single leaves.

PAN-AMERICAN CONGRESS, owing to the efforts of James G. Blaine, delegates from the republics of Mexico and the Central and South American states assembled at Washington, Oct. 2, 1889, for the purpose of discussing the formation of an American Customs Union, under which the trade of American nations with each other might be maintained. The congress continued without final adjournment for five months, and voted to recommend the establishment of regular communications between the ports of the several American states, from trade and customs regulations, weights and measures, patent, copyright, and trade mark laws, a common, legal-tender silver coin, and a plain arbitration of all questions and disputes.

The congress adjourned April 19, 1890. In 1900 the United States government invited all the American republics to meet in a similar congress in October, 1901. An invitation to meet in the City of Mexico was accepted, and the congress was held in October, 1902.

PAN-AMERICAN EXPOSITION, an exposition held in Buffalo, N. Y., from May 1, to November 2, 1901. Its purpose was to illustrate the progress of the countries in the Western Hemisphere during the nineteenth century. A site in the northern part of Buffalo covering an area of 350 acres and within three miles of the business center of the city, was chosen. The color treatment gained for the exposition the name of the Rainbow City, or the Tinted City. The Triumphal Causeway was perhaps the most ornate feature. It represented the apotheosis of the United States, an allegorization of national pride, while the Electric Tower at the other end symbolized the great waters, suggesting that the importance, growth, and prosperity of Buffalo were due chiefly to the Great Lake system and waterways on which it was located. The total attendance was given as 8,179,674. On September 6th President William McKinley was shot down by an assassin while holding a public reception in the Temple of Music, and he died eight days later at the house of John J. Milburn, the president of the exposition.

PANAY, an island of the Philippines, between Mindoro and Negros. It is of triangular form, about 100 miles broad and 100 miles long. It is mountainous but very fertile, and the inhabitants have made considerable progress in civilization. Capital Iloilo. Pop. 735,000.

PANCAKE, a thin cake of batter fried or baked in a pan. Pancakes are regarded as specially the dish to be eaten on Shrove Tuesday.

PANCREAS, the sweet-bread of animals; one of the viscera of the abdomen. In man it lies behind the stomach in front of the first and second lumbar vertebrae. The pancreas is an oblong gland about 8 inches long, $1\frac{1}{2}$ inch broad, and from $\frac{1}{2}$ to 1 inch thick. Its right extremity, called the head, lies in a bend of the duodenum. The tail or left extremity extends to the spleen. The structure of the pancreas is similar to that of the salivary glands. It is composed of lobules throughout. The secretion of this gland is conveyed to the intestines by the pancreatic duct. This duct runs from right to left, and is of the size of a quill at its intestinal end. The pancreatic juice is a clear, ropy fluid. The functions of the pancreatic juice in digestion are devoted to the conversion of starchy elements into sugar and to the assimilation of fatty matters. It also acts upon albuminoid matters.

PANDA, or **Wah**, an animal of the bear family found in the woody parts of the mountains of Northern India, about equal to a large cat in size. It is chestnut-brown in color, and dwells chiefly in trees, preying on birds, small quadrupeds, and large insects.

PANDION. See Osprey.

PANDIT, or **PUNDEIT**, a learned Brahman; one versed in the Sanskrit

language, and in the sciences, laws, and religion of the Hindus.

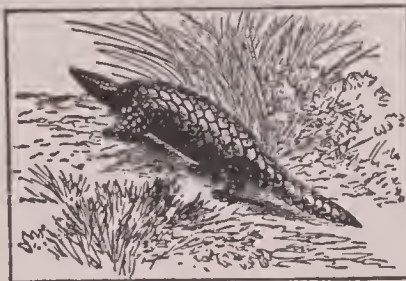
PANDO'RA, in Greek mythology, the first woman on earth, sent by Zeus to mankind in vengeance for Prometheus's theft of heavenly fire. Each of the gods gave her some gift fatal to man. Ac-



Panda.

cording to later accounts the gods gave her a box full of blessings for mankind, but on her opening the box they all flew away, except hope. Epimetheus, brother of Prometheus, married her.

PAN'GOLIN, the name applied to the Scaly Ant-eaters. They occur in Southern Asia and Africa; have the body invested by a covering of imbricated scales of horny material; vary from 3 to 4 feet in length, and defend themselves by assuming the form of a ball. The tail is long, and the feet are provided with strong curved claws, which



Four-toed pangolin.

assist the animals in burrowing. The jaws are destitute of teeth, and the tongue is of great length. The food consists of insects. The four-toed pangolin inhabits West Africa.

PANORA'MA, a painting in which all the objects that can be seen naturally from one point are represented on the concave side of a whole or half cylindrical wall, the point of view being the axis of the cylinder. A painting of this kind when well mounted produces a complete illusion, and no other method is so well calculated to give an exact idea of an actual view.

PANSY. See Violet.

PAN'TAGRAPH. See Pantograph.

PAN'THEISM, in philosophy, the doctrine of the substantial identity of God and the universe, a doctrine that stands midway between atheism and dogmatic theism. The origin of the idea of a God with the theist and the pantheist is the same. It is by reasoning upon ourselves and the surrounding objects of which we are cognizant that we come to infer the existence of some superior being upon whom they all depend, from whom they proceed, or in whom they subsist. Pantheism assumes the identity of cause and effect. Matter, not less than mind, is with it the necessary emanation of the Deity. The unity of the universe is a

unity which embraces all existing variety, a unity in which all contradictions and all existing and inexplicable congruities are combined. Pantheism has been the foundation of nearly all the chief forms of religion which have existed in the world. It was represented in the East by the Sankhya of Kapila, a celebrated system of Indian philosophy. The Persian, Greek, and Egyptian religious systems were also pantheistic. Spinoza is the most representative pantheist of modern times. A twofold division of pantheism has been proposed: 1. That which loses the world in God, one only being in whose modifications are the individual phenomena. 2. That which loses God in the world and totally denies the substantiality of God.

PAN'THEON (pan-thē'on), a celebrated temple at Rome, built in 27 B.C. by Marcus Agrippa. It is a large edifice of brick, built in circular form, with a portico of lofty columns. It has the finest dome in the world (142½ feet internal diameter, 143 feet internal height), and its portico is almost equally celebrated. It is now a church, and is known as Santa Maria Rotonda. Raffael and other famous men are buried within its walls. The Pantheon in Paris, for some time church of St. Geneviève, is a noble edifice with a lofty dome, devoted to the interment of illustrious men.

PANTHER, one of the Felidæ or cat tribe, of a yellow color, diversified with roundish black spots, a native of Asia and Africa. The panther is now sup-



Panther.

posed to be identical with, or a mere variety of the leopard. The name panther (in vulgar language painter) is given to the puma in America.

PANTOGRAPH, also called Pantagraph and Pentagraph, an instrument consisting of four limbs joined together by movable joints, and so constructed that by means of it maps and plans may be copied mechanically either on the scale on which they are drawn or on an enlarged or reduced scale. It is made in a variety of forms.

PAN'TOMIME, properly a theatrical representation without words, consisting of gestures, generally accompanied by music and dancing. The modern pantomime is a spectacular play of a burlesque character, founded on some

popular fable, and interspersed with singing and dancing, followed by a harlequinade, the chief characters in which are the harlequin, pantaloen, columbine, and clown, which may be traced back to the Italian pantomime, although their present development is almost entirely modern.

PAPACY. See Popes.

PAPAL STATES, the name given to that portion of Central Italy of which the pope was sovereign by virtue of his position. The territory extended irregularly from the Adriatic to the Mediterranean, and latterly comprised an area of 15,289 sq. miles with 3,126,000 inhabitants. Rome was the capital. The foundation of the Papal States was laid in 754, when Pepin le Bref presented the exarchate of Ravenna to Stephen II., bishop of Rome. Benevento was added in 1053, and in 1102 Matilda of Tuscany left Parma, Modena, and Tuscany to the pope. In 1201 the Papal States were formally constituted an independent monarchy. Subsequently various territories were added to or subtracted from the pope's possessions, which were incorporated with France by Napoleon in 1809, but restored to the pope in 1814. A revolution broke out in Rome in 1848, and the pope fled to Gaeta, but he was reinstated by French troops, and Rome was garrisoned by French soldiers until 1870. In the meantime one state after another threw off its allegiance to the pope and joined the kingdom of Italy, and when the French left Rome in August, 1870, King Victor Emanuel took possession of the city, declared it the capital of Italy, and thus abolished the temporal power of the pope.

PAPAW', a tree of South America, now widely cultivated in tropical countries. It grows to the height of 18 or 20 feet, with a soft herbaceous stem, naked nearly to the top, where the



Papaw.

leaves issue on every side on long foot-stalks. Between the leaves grow the flower and the fruit, which is of the size of a melon. The juice of the tree is acrid and milky, but the fruit when boiled is eaten with meat, like other vegetables. The juice of the unripe fruit is a powerful vermifuge; the powder of the seed even answers the same purpose. The juice of the tree or its fruit, or an infusion of it, has the singular property of rendering the toughest meat tender,

and this is even said to be effected by hanging the meat among the branches. The papaw of North America produces a sweet edible fruit.

PAPER, a thin and flexible substance, manufactured principally of vegetable fibre, used for writing and printing on, and for various other purposes. Egypt, China, and Japan are the countries in which the earliest manufacture of paper is known to have been carried on. The Egyptian paper was made from the papyrus (whence the word paper), but this was different from paper properly so called. (See Papyrus.) According to the Chinese the fabrication of paper from cotton and other vegetable fibres was invented by them in the 2d century B.C. From the East it passed to the West, and it was introduced into Europe by the Arabs. Spain is said to have been the first country in Europe in which paper from cotton was made, probably in the 11th century; and at a later period the manufacture was carried on in Italy, France, and Germany. It cannot now be ascertained at what time linen rags were first brought into use for making paper; but remnants of Spanish paper of the 12th century appear to indicate that attempts were made as early as that time to add linen rags to the cotton ones.

Paper is made either by the hand or by machinery. When it is made by the hand the pulp is placed in a stone vat, in which revolves an agitator, which keeps the fibrous particles equally diffused throughout the mass; and the workman is provided with a mould, which is a square frame with a fine wire bottom, resembling a sieve, of the size of the intended sheet. These moulds are sometimes made with the wires lying all one way, except a few which are placed at intervals crosswise to bind the others together, and sometimes with the wires crossing each other as in a woven fabric. Paper made with moulds of the former kind is said to be laid, and that made with those of the latter kind wove. The so-called water-mark on paper is made by a design woven in wire in the mould. Above the mould the workman places a light frame called a deckle, which limits the size of the sheet. He then dips the mould and deckle into the pulp, a portion of which he lifts up horizontally between the two, gently shaking the mould from side to side, to distribute the fibers equally and make them cohere more firmly, the water, of course, draining out through the wire meshes. The sheets thus formed are subjected to pressure, first between felts, and afterward alone. They are then sized, pressed once more, and hung up separately on lines in a room to dry. The freedom with which they are allowed to contract under this method of drying gives to hand-made paper its superior firmness and compactness. After drying they are ready for making up into quires and reams, unless they are to be glazed, which is done by submitting the sheets to a very high pressure between plates of zinc or copper.

In paper-making by machinery, a process patented in France in the end of 18th century, the pulp is placed in wooden or iron vessels at one end of the

machine, and is kept constantly agitated by a revolving spindle with arms attached to it. From these the pulp passes to the pulp-regulator, by which the supply of pulp to the machine is kept constant, thence through sand-catchers and strainers till it reaches the part of the machine which corresponds to the hand-mould. This consists of an endless web of brass wire-cloth, which constantly moves forward above a series of revolving rollers, while a vibratory motion from side to side is also given to it, which has the same object as shaking the mould in making by the hand. Meanwhile its edges are kept even by what are called deckle or boundary straps of vulcanized india-rubber. At the end of the wire-cloth the pulp comes to the dandy-roll, which impresses it with any mark that is desired. The fabric is now received by the felts, also, like the wire part of the machine, an endless web, the remaining water being pressed out in this part of the machine by four or five consecutive rollers. If intended for a printing-paper, or any other kind that requires no special sizing, it is dried by being passed round a succession of large hot cylinders, with intermediate smoothing rolls. It is then rendered glossy on the surface by passing between polished cast-iron rollers called calenders, and is finally wound on a reel at the end of the machine, or submitted to the action of the cutting machinery, by which it is cut up into sheets of the desired size. If the paper is to be sized, the web, after leaving the machine is passed through the sizing-tub, and is then led round a series of large skeleton drums (sometimes as many as forty) with revolving fans in the inside, by the action of which it is dried. If the paper were dried by hot cylinders after the sizing, there would be a loss of strength in consequence of the drying being too rapid. After being dried the paper is glazed by the glazing-rollers, and then cut up. In some cases the sizing is done after the paper has been cut into sheets, these being then hung up to dry on lines, like hand-made paper, acquiring in the process something of the same hardness and strength. The total length of a paper-machine, from the beginning of the wire-cloth to the cutters, is frequently more than 100 feet.

Blotting and filtering paper are both made in the same way as ordinary paper except that the sizing is omitted. Copying paper is made by smearing writing paper with a composition of lard and black-lead, which, after being left alone for a day or so, is scraped smooth and wiped with a soft cloth. Incombustible paper has been made from asbestos, but since fire removes the ink from a book printed on this material, the invention is of no utility, even though the paper itself be indestructible. Indelible cheque paper has been patented on several occasions. In one kind of it the paper is treated with an insoluble ferrocyanide and an insoluble salt of manganese, and is sized with acetate of alumina instead of alum. Parchment paper or vegetable parchment is made from ordinary unsized paper by treatment with sulphuric acid or oil of vitriol and ammonia. The so-called rice paper

is not an artificial paper, but a vegetable membrane imported from China, and obtained apparently from the pith of a plant. Tissue paper is a very thin paper of a silky softness used to protect engravings in books and for various other purposes. Tracing paper is made from tissue paper by soaking it with Canada balsam and oil of turpentine or nut-oil and turpentine.

In recent times the uses of paper have greatly multiplied. Besides being largely employed for making collars, cuffs, and other articles of dress, it is sometimes used for making huts in the backwoods of America; for making boats, pipes, and tanks for water; cuirasses to resist musket-bullets, wheels for railway-carriages, and even bells and cannons. Paper wheels have been used for Pullman cars, and have worn out one set of tires. Cannons made of paper have actually been tried with success. In the production of paper England, America, Germany, and France take the lead.

PAPER-HANGINGS, ornamental papers often pasted on the walls of the rooms in dwelling-houses. The staining of papers for this purpose is said to be a Chinese invention, and was introduced into France at the beginning of the 17th century. It is now common everywhere, but more especially in France, England, and the United States. Most of the processes in paper-staining are now usually done by machinery; but there is still much hand-work in the finer qualities, especially those produced in France. The first operation is that of grounding, which consists in covering the surface with some dull color, the tint of which varies. Papers with a glazed ground are usually glazed immediately after receiving the ground tint. The designs on the surface of paper-hangings are applied by hand processes and machines exactly similar to those employed in calico-printing.

PAPER MONEY. See Currency.

PAPER-MULBERRY. See Mulberry.

PAPER-NAUTILUS. See Argonaut.

PAPIER MACHE (pâp-yā mā-shā), a substance made of cuttings of white or brown paper boiled in water, and beaten in a mortar till they are reduced into a kind of paste, and then boiled with a solution of gum Arabic or of size to give tenacity to the paste. Sulphate of iron, quicklime, and glue or white of egg, are sometimes added to enable the material to resist the action of water, and borax and phosphate of soda to render it to a great extent fire-proof. It is used for making all sorts of useful and ornamental articles that can be formed in moulds. Another variety of papier mâché is made by pasting or gluing sheets of paper together, and pressing them when soft into the form which it is desired to give them.

PAPILLÆ, the name applied in physiology to small or minute processes protruding from the surface of the skin, or of membranes generally, and which may possess either a secretory or other function. The human skin exhibits numerous papillæ, with divided or single extremities, and through which the sense of touch is chiefly exercised. The papillæ of the tongue are important in

connection with the sense of taste. See Skin and Tongue.

PAPPENHEIM, Gottfried Heinrich, Count of, imperial general in the Thirty Years' war, born in 1594 at Pappenheim, in Bavaria. In 1626 he conquered with the assistance of the Bavarians, 40,000 peasants in Upper Austria, and in 1630 joined Tilly, who ascribed the loss of the battle of Leipzig in 1631 to his impetuosity. He appeared on the field of Lützen on the side of Wallenstein, but was mortally wounded, and died the day after the battle, 1632.

PAPYRUS, an aquatic plant. It has acquired celebrity from furnishing the paper of the ancient Egyptians. The root is very large, hard, and, creeping; the stem is several inches thick, naked, except at the base, 8 to 15 or more feet



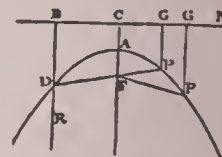
Egyptian papyrus.

high, triangular above, and terminated by a compound, wide-spreading, and beautiful umbel, which is surrounded with an involucre composed of eight large sword-shaped leaves. The little scaly spikelets of inconspicuous flowers are placed at the extremity of the rays of this umbel. Formerly it was extensively cultivated in Lower Egypt, but is now rare there. It is abundant in the equatorial regions of Africa in many places, and is found also in Western Africa and in Southern Italy. The inhabitants of some countries where it grows manufacture it into various articles, including sail-cloth, cordage, and even wearing apparel and boats. Among the ancient Egyptians its uses were equally numerous, but it is best known as furnishing a sort of paper. This consisted of thin strips carefully separated from the stem longitudinally, laid side by side, and then covered transversely by shorter strips, the whole being caused to adhere together by the use of water and probably some gummy matter. A sheet of this kind formed really a sort of mat. In extensive writings a number of these sheets were united into one long roll, the writing materials being a reed pen and ink made of animal charcoal and oil. Thousands of these papyri or papyrus rolls still exist (many of them were found in the ruins of Heracleum), but their contents, so far as deciphered, with a few exceptions, have only been of moderate value.

PARA, or **BELEM**, a city and seaport in Brazil, the capital of the state of Pará. The principal buildings are the governor's palace, the cathedral, and the churches of Santa Anna and Sao Joao Baptista. It is the seat of the legislative

assembly of the state. The principal exports are caoutchouc, cacao, Brazil-nuts, copaiba, rice, piassava, sarsaparilla, annatto, cotton, etc. Pop. 50,064. —The state of Pará, the most northerly in Brazil, comprises an area of 443,790 sq. miles on both sides of the lower Amazon, and consists chiefly of vast alluvial plains connected with this river and its tributaries. Pop. 407,350.

PARAB'OLA, one of the curves known as conic sections. If a right cone is cut by a plane parallel to a slant side, the



Parabola.

section is a parabola. It may also be defined as the curve traced out by a point which moves in such a way that its distance from a fixed point, called the "focus," is always equal to its perpendicular distance from a fixed straight line, called the "directrix." In the figure b h is the directrix and f the focus, while p is a point that moves so that the perpendicular gp is always equal to the line p f; the curve p a d described by a point so moving is a parabola. The line f a c through the focus is the axis or principal diameter; any line parallel to it as b d r is a diameter. The path of a projectile in vacuo, when not a vertical straight line, is parabolic.

PARACEL'SUS, or **PHILIPPUS AUREOLUS THEOPHRASTUS BOMBASTUS VON HOHENHEIM**, empiric and alchemist, born at Einsiedeln, in the canton of Schwyz, in Switzerland, in 1493. Dissatisfied with the means of acquiring knowledge in his native country, he traveled over the greater part of Europe, everywhere seeking to add to his knowledge. In the course of his travels he became acquainted with remedies not in common use among physicians (probably preparations of mercury), by means of which he performed extraordinary cures, and obtained great reputation. He died at the hospital of St. Sebastian at Salzburg in 1541. For a long time he was regarded as little better than a charlatan, but he enriched science, particularly chemistry and medicine, with some valuable discoveries, and, indeed, is sometimes looked upon as the founder of modern therapeutics.

PARACHUTE (pa'ra-shôt), an apparatus of an umbrella shape and construction, usually about 20 or 30 feet in diameter, attached to balloons, by means of which the aeronaut may descend slowly from a great height. It is shut when carried up, and expands of itself when the aeronaut begins to descend; but it is not altogether to be depended on, and accidents in connection with its use have been frequent. The earliest mention of a machine of this kind is in a MS. describing experiments made with one in 1617. In 1783 the French physician Lenormand made several further experiments at Montpellier; and shortly after the machine

became well known through the descents of Blanchard in Paris and London. See Aeronautics.

PARADISE, the garden of Eden. The word is originally Persian, and signifies a park. It was introduced into the Greek language by Xenophon, and has been introduced into modern languages



Parachute.

as a name for the garden of Eden (and hence of any abode of happiness) through its use in that sense in the Septuagint.

PARADISE, Bird of. See Bird of Paradise.

PAR'ADOX, a statement or proposition which seems to be absurd, or at variance with common sense, or to contradict some previously-ascertained truth, though, when duly investigated, it may prove to be well founded.

PAR'AFFIN, a solid white substance of a waxy appearance which is separated from petroleum and ozokerit, and is also largely obtained by the destructive distillation of various organic bodies, such as brown coal or lignite, bituminous coal, shale, etc. In Scotland the paraffin industry is highly important. The process generally consists in heating bituminous shale in iron retorts at a low red heat; condensing the tarry products, and purifying these by distillation, washing successively with soda, water, and acid, and again distilling. Those portions of the oil which solidify in the final distillations are collected separately from the liquid portions, washed with soda and acid, and crystallized or again distilled. The partially purified paraffin (called paraffin scale) is now again treated with acid, allowed to solidify, submitted to the action of centrifugal machines, and finally strongly pressed in order to remove any liquid oil which may still adhere to it. The refined paraffin is largely manufactured into candles, which may be either white or colored, and may be mixed with a certain quantity of wax, etc. The liquid oils obtained in the process come into commerce under the general name of paraffin-oil, the lighter oils being used for illuminating and the heavier for lubricating purposes. Paraffin has received its name on account of its remarkable indifference to or want of affinity with other substances. Besides being used for candles, it is used for vestas and tapers, for water-proofing, sizing, and glazing fabrics, as an electric insulator, as a coating for the inside of beer barrels, etc.

PARAGUAY (pá'rá-gwī), a republic of South America, surrounded by the

Argentine Republic, Brazil, and Bolivia; area, 97,696 sq. miles. The climate is agreeable, the mean annual temperature being about 75°. The natural fertility of the soil is shown by a vegetation of almost unequalled luxuriance and grandeur. In the forests are found at least sixty varieties of timber-tree, besides dye-woods, gums, drugs, perfumes, vegetable oils, and fruits. Many of the hills are covered with the yerba maté or Paraguay tea. The larger plains are roamed over by immense herds of cattle, which yield large quantities of hides, tallow, bones, etc.; and on all the cultivated alluvial tracts sugar-cane, cotton, tobacco, rice, corn, etc., are raised in profusion. Asuncion, the capital, and Villa Rica are connected by a railway about 90 miles long.

Paraguay was originally a Spanish colony, the first settlement being made in 1535. In 1608 a number of Spanish Jesuits established a powerful and well-organized government, which lasted till 1758, when it was overthrown by the Brazilians and Spaniards. Early in the 19th century its isolated position enabled it by a single effort to emancipate itself from Spanish rule. In 1844 Don Carlos Antonio Lopez was elected president for ten years, and soon after the country was declared free and open to both foreigners and foreign commerce. Don Carlos Lopez remained president of Paraguay till his death in 1862, when he was succeeded by his son Don Francisco, who concluded treaties of commerce with England, France, the United States, Brazil, etc., and did all in his power to promote the growth of agriculture and industry in the land. A popular constitutional government has been established, and the state is making rapid progress in population and prosperity. The people are largely half-breeds or of Indian blood. Pop. 635,571.

PARAGUAY, a river of South America rises in the Brazilian state of Matto Grosso, takes a course generally southward, and joins the Paraná at the southwest angle of the state of Paraguay after a course of some 1300 miles. It receives the Pilcomayo, Vermejo, and other large rivers, and is a valuable highway of trade to Paraguay and Brazil.

PARAKEETS, or **PARROQUETS**, a sub-family or group of the parrots, characterized by their generally small size and their long tail-feathers. The islands of the Eastern Archipelago form the chief habitat of these birds, but species also occur in India and Australia. Among the most familiar forms are the rose-ringed and Alexandrine parakeets. The former, found in India and on the eastern coasts of Africa, has a bright-green body and a pink circle round the neck. The Alexandrine parakeet of India is a nearly allied species. These birds may be taught to speak with distinctness. The ground parakeets of Australia live among the reeds and grass of swamps, generally in solitary pairs. The common ground parakeet of Australia possesses a green and black plumage, the tail being similarly colored, and the body-feathers having each a band of dark-brown hue. The grass parakeets of Australia, of which the

small warbling parakeet is a good example, inhabit the central flat lands of Australia, and feed on the seeds of the grasses covering the plains. They perch on the eucalypti or gum-trees during the day, and the nests are situated in the hollows of these trees. Contrary



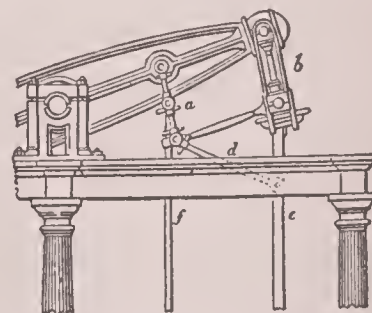
Rose-ringed parakeet.

to most parrots they have an agreeable voice.

PAR'ALLAX, the apparent change of place which bodies undergo by being viewed from different points. Thus an observer at a sees an object b in line with an object c, but when he moves to d it is in line with e, and seems to have gone backward. The term has become technical in astronomy, and implies the difference of the apparent positions of any celestial object when viewed from the surface of the earth and from the center of either the earth or the sun. The term "parallax" is also employed to denote the non-coincidence of the cross fibers in a telescope with the focus of the eye-glass.

PARALLEL LINES, in geometry, straight lines in the same plane which never meet, no matter how far produced.

PARALLEL MOTION, a mechanical contrivance employed by Watt to communicate the alternate pushes and pulls of the piston-rod of a steam-engine to the end of a vibrating beam, and which prevents the action of forces tending to



Part of beam of condensing engine. a b c d, Parallel motion. e, Piston-rod. f, Pump-rod.

destroy the right-line motion of the piston-rod. The motion given to the end of the rod is not accurately in a straight line, but it is very nearly so. Watt's parallel motion is still employed in all stationary beam-engines. In marine beam-engines the arrangement

employed differs somewhat in form, but is the same in principle as Watt's contrivance.

PARALLELOGRAM OF FORCES, an important dynamical principle, deduced by Newton, which may be stated thus: If two forces acting in different directions on a particle at the same time be represented in magnitude and direction by two straight lines meeting at the particle, their resultant effect in giving motion to the particle is that of a force represented in magnitude and direction by the diagonal (terminating in the particle) of the parallelogram, of which the two former lines are two sides.

PARALLELS OF LATITUDE. See Latitude.

PARALYSIS, a bodily ailment, which in its effect consists in loss of power in moving or loss of feeling, or in both, and it is caused by disease of the brain, spinal cord, or nerves, or it may be due to lead-poisoning. When the paralysis is limited to one side of the body, and the voluntary power of moving the muscles is lost, this is due to disease of the brain and receives the specific name of hemiplegia. It is generally caused by the bursting of a blood-vessel in the brain; it may also be due to a blood-vessel being blocked by a clot of blood. The paralysis may be sudden and without unconsciousness, or it may be gradual and attended with sickness, fainting, and confusion of mind. In ordinary cases it will be found that one side of the body is powerless, the face twisted, the speech thick and indistinct. Recovery may be complete, or partial, or the attack may prove fatal. In any case the shock is apt to be repeated. When one side of the body and the opposite side of the face is affected, the disease, which has its seat in the region of the medulla oblongata, receives the name of cross paralysis, and is considered more dangerous than ordinary hemiplegia. When, again, the disease is situated in the spinal cord, the paralysis, which receives the name of paraplegia, may affect either the upper or lower part of the body, or motion may be lost on one side and sensation on the other. Local paralysis is the term used when disease or injury affects a specific nerve-trunk, and has no connection with disease of the brain or spinal cord. The effect of this local paralysis is to deprive the muscles of their nerve-supply, in which case they lose their power, becoming weak and faint.

PARANA, a river in South America, the largest except the Amazon, and draining a larger basin than any other river in the New World except the Amazon and the Mississippi. Its length, from its sources to its junction with the Paraguay, is probably 1500 miles, and thence to the sea 600 miles more.

PARANA, a state of Southern Brazil, having on the north the state of Sao Paulo, on the east the Atlantic Ocean, south the state of Santa Catharina, and west Paraguay and the province Matto Grosso; area, 85,429 sq. miles. Its chief town is Curitiba. Pop. 187,548.

PARANOIA, a form of insanity in which for years the intellect of the patient remains unimpaired, though

dominated by a systematized delusion. An acquired or transmitted neuro-degenerative taint is almost invariably present, though a sudden or severe injury to the nervous system may be the cause. It may follow a severe fever or an injury to the head. It may equally well be caused by great emotional strain or a constantly harassing thought.

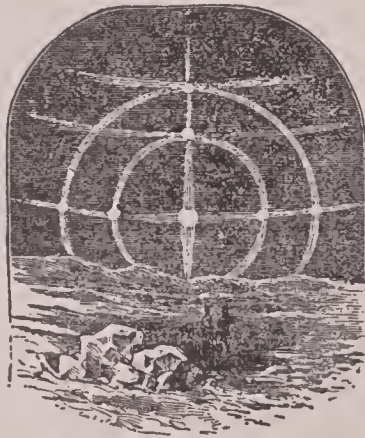
Paranoiacs usually present somatic evidences of degeneration, such as a deformed or asymmetrical skull, badly developed teeth, strabismus, atrophy of one side of the body, and differences in size of hands or feet.

PARAPET, in fortification, a work, usually of earth, intended to protect the troops within the ramparts, as well as the pieces of artillery used in the defense. In order to fire the defenders ascend a ledge called a banquette, about half-way up the parapet. In architecture the term parapet is applied to the structures placed at the edges of platforms, balconies, roofs of houses, sides of bridges, etc., to prevent people from falling over.

PARAPHERNALIA, in law, a woman's apparel, jewels, and other things, which, in the lifetime of her husband, she wore as the ornaments of her person, and to which she has a distinct claim.

PARASELENE (pa-ra-se-lē'nē), a luminous ring or circle sometimes seen round the moon, or there may be more than one ring as well as certain bright spots, bearing some resemblance to the moon. Paraselene or mock moons are analogous to parhelia or mock suns. See Parhelion.

PARASITES, the name applied to animals which attach themselves to the exterior or inhabit various situations in the interior, of the bodies of other



Paraselenæ.

animals, including such forms as tape-worms, flukes, scolices or hydatids, fish-lice, bird-lice, common lice, etc. True parasites obtain their nourishment from the animals on which they live, but there is another class of parasites that only obtain a lodging or abode at the expense of the animals they accompany.

PARBUCKLE, a method of raising or lowering any cylindrical body, such as a barrel, by an inclined plane and a rope, the rope being doubled, the double placed round a post at the top of the plane, and the ends passed under and round the object to be raised or lowered, when by pulling or slackening this can be accomplished.

PARCHMENT, the skins of sheep, she-goats, and several other animals so dressed or prepared as to be rendered fit for writing on. This is done by stretching the skin on a frame, separating all the flesh and hair from the skin, reducing its thickness with a sharp instrument, and smoothing the surface with pumice-stone covered with pulverized chalk or slaked lime. After it is reduced to something less than half its original thickness, it is smoothed and slowly dried for use. The name parchment signifies literally paper of Pergamus (Asia Minor), where parchment was first extensively brought into use about 200 B.C. Vellum is a finer kind prepared from the skins of calves or kids. Parchment is now chiefly used for writing important legal documents on.

PARCHMENT, Vegetable. See Paper.

PARDON, the remission of the penalty of a crime or offense. In England, in nearly all cases of crime except where there is an impeachment, a pardon from the crown may be granted before a trial as well as after; and it stops further progress in the inquiry and prosecution at whatever time it is granted. In America the constitution provides that the president "shall have power to grant reprieves and pardon for offenses against the United States, except in cases of impeachment." The senate has the whole power of trying impeachments.

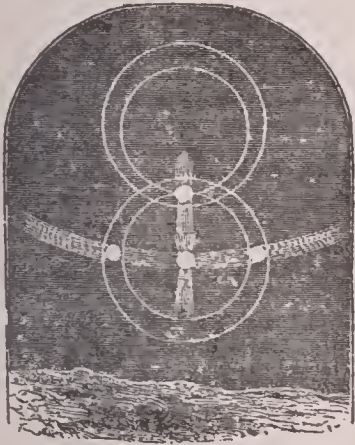
PAREGORIC ELIXIR, known also as the camphorated tincture of opium, is a solution of powdered opium, camphor, benzoic acid, and oil of anise. When used carefully it is found to be an excellent anodyne and anti-spasmodic.

PARESIS, popularly but improperly called softening of the brain, is more common in males than in females. It occurs most frequently between the ages of thirty and fifty-five. Few cases show hereditary tendency. While in general the disease is said to be more frequent among the lower classes, in this country it is most common among the middle and upper classes. About 80 per cent of cases give a syphilitic history. Alcoholic and sexual excesses and severe mental or emotional strains may also be mentioned as factors.

PARENTHESIS, pl. Parentheses, an explanatory or qualifying sentence, or part of a sentence, inserted into the midst of another sentence, without being grammatically connected with it. It is generally marked off by upright curves (), but frequently by dashes —, and even by commas.

PARHELION, a mock sun, having the appearance of the sun itself, and seen by the side of that luminary. Parhelia are sometimes double, sometimes triple, and sometimes more numerous. They appear at the same height above the horizon as the true sun, and they are always connected with one another by a white circle or halo. They are the result of certain modifications which light undergoes when it falls on the crystals of ice, rain-drops, or minute particles that constitute suitably situated clouds. Parhelia which appear on the same side of the circle with the true sun are often tinted with prismatic colors.

PA'RIAH, a name somewhat loosely applied to any of the lowest class of people in Hindustan, who have, properly speaking, no caste, hence, one despised and condemned by society; an outcast. Properly, however, Pariah (a Tamil name) is applied to the members of a somewhat widely spread race in Southern India, generally of the Hindu religion, and though regarded by the Hindus as of the lowest grade, yet



Parhella.

superior to some ten other castes in their own country. They are frequently serfs to the agricultural class, or servants to Europeans.

PARIAN MARBLE, a mellow-tinted marble, highly valued by the ancients, and chosen for their choicest works. The principal blocks were obtained from Mount Marpassus, in the island of Paros.

PARIS, the capital of France and of the department of the Seine, lies in the Seine valley surrounded by heights. Through the valley the river runs from east to west, inclosing two islands, upon which part of the city is built. It is navigable by small steamers. The quays or embankments, which extend along the Seine on both sides, being built of solid masonry, protect the city from inundation and form excellent promenades. The river, which within the city is fully 530 feet in width, is crossed by numerous bridges, the more important being Pont Neuf, Pont des Arts, Pont du Carrousel, Pont Royal, Pont de l'Alma, etc. The city is surrounded by a line of fortifications which measures 22 miles; outside of this is the enceinte, while beyond that again are the detached forts. These now form two main lines of defense. The inner line consists of sixteen forts, the outer line of eighteen forts besides redoubts; the area thus inclosed measuring 430 sq. miles, with an encircling line of 77 miles. The water supply of the city is derived from the Seine, the Marne, the Vannes, the Ourcq canal, from artesian wells, and from springs, but is still very defective.

In the older parts of the city the streets are narrow and irregular, but in the newer districts the avenues are straight, wide, and well-paved. What are known as "the boulevards" include the interior, exterior, and military. That which is specifically called The Boulevard extends in an irregular arc on the north side of the Seine, from the

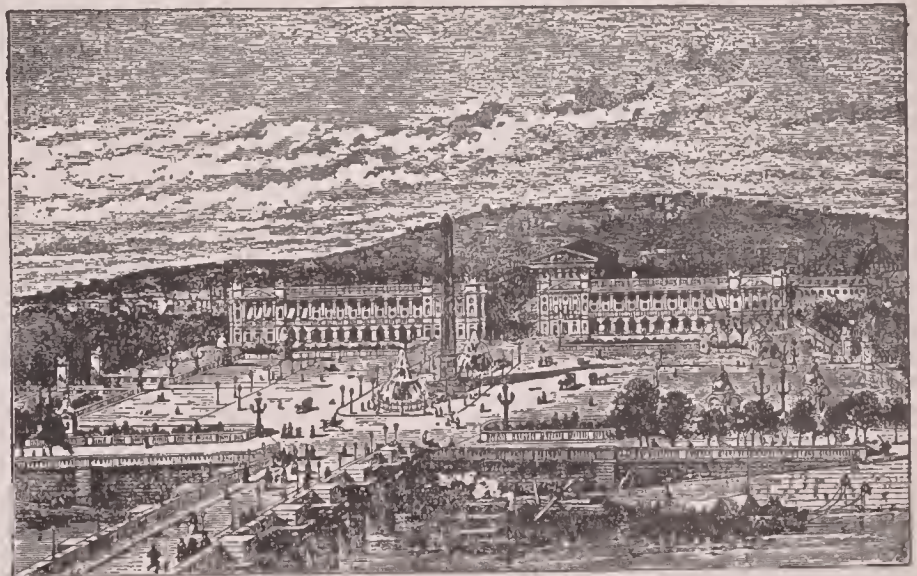
Place de la Bastille in the east to the Place de la Madeleine in the west. It includes the Boulevards du Temple, St. Martin, St. Denis, des Italiens, Capuchins, Madeleine, etc., and its length of nearly 3 miles forms the most stirring part of the city. Here may be noted also the triumphal arches of the Porte St. Denis and the Porte St. Martin, the former of which is 72 feet in height. On the south side of the Seine the boulevards are neither so numerous nor so extensive, the best known being the Boulevard St. Germain, which extends from the Pont Sully to the Pont de la Concorde. The exterior boulevards are so named because they are outside the city limits of 1860; and the military boulevards, still further out, extend round the fortifications. After the boulevards mentioned the best streets are the Rue de Rivoli, Rue Castiglione, Rue de la Paix, Rue de la Chaussée d'Antin, the Rue des Pyramides, and twelve fine avenues radiating from the Place de l'Etoile. There are six passenger stations for the railways to the various parts of the country, and a railway around the city (the ceinture), by means of which interchange of traffic between the different lines is effected. There are also tramway lines to Versailles, St. Cloud, and other places in the suburbs.

The most notable public squares or places are the Place de la Concorde one of the largest and most elegant squares in Europe, adorned by an Egyptian obelisk, fountains, and statues; Place de l'Etoile, in which is situated the Arc de Triomphe, a splendid structure 152

feet in height; the Place Vendôme, with column to Napoleon I.; Place des Victoires, with equestrian statue of Louis XIV.; Place de la Bastille, with the Column of July; Place de la République, with colossal statue of the Republic, etc. Within the city are situated the gardens of the Tuileries, which are adorned with numerous statues and fountains; the gardens of the Luxembourg, in which are fine conservatories of rare plants; the Jardin des Plantes, in which are the botanical and zoological gardens, hothouses, museums, etc.,

which have made this scientific institution famous; the Buttes-Chaumont Gardens, in which an extensive old quarry has been turned to good account in enhancing the beauty of the situation; the Parc Monceaux; and the Champs Elysées, the latter being a favorite promenade of all classes. But the most extensive parks are outside the city. Of these the Bois de Boulogne, on the west, covers an area of 2150 acres, gives an extensive view toward St. Cloud and Mont Valérien, comprises the race-courses of Longchamps and Auteuil, and in it are lakes, cascades, ornamental cafés, and the Jardin d'Acclimatation. The Bois de Vincennes, on the east, even larger, is similarly adorned with artificial lakes and streams, and its high plateau offers a fine view over the surrounding country. The most celebrated and extensive cemetery in Paris is Père la Chaise (106½ acres), finely situated and containing the tombs of many celebrities. The Catacombs are ancient quarries which extend under a portion of the southern part of the city, and in them are deposited the bones removed from old cemeteries now built over.

Of the churches of Paris the most celebrated is the Cathedral of Notre Dame, situated on one of the islands of the Seine, called the Ile de la Cité. It is a vast cruciform structure, with a lofty west front flanked by two square towers, the walls sustained by many flying-buttresses, and the eastern end octagonal. The whole length of the church is 426 feet, its breadth 164 feet. The foundation of Notre Dame belongs to



Paris.—The Place de la Concorde and Montmartre from the Chamber of Deputies.

the 6th century; the present edifice dates from 1163, but it was not finished till early in the 14th century, being restored in 1845. The church of La Madeleine, a modern structure in the style of a great Roman temple, with a peristyle of lofty Corinthian columns, stands on an elevated basement fronting the north end of the Rue Royale; the church of St. Geneviève, built about the close of the last century, was after its completion set apart, under the title of the Panthéon, as the burying-place of illustrious Frenchmen. We may also

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name St. Eustache (1532-1637), an interesting example of French Renaissance architecture; St. Germain l'Auxerrois; St. Gervais; St. Roch; St. Sulpice; Notre Dame de Lorette; St. Vincent de Paul; etc. On the very summit of Montmartre is the Church of the Sacred Heart, a vast new structure in the Byzantine style estimated to cost \$5,000,000. The chief French Protestant churches are the Oratoire and Rédemption. There are several churches belonging to English, Scotch, and American denominations, a Russian Greek church, and several synagogues.

Notable among the public buildings of Paris are its palaces. The Louvre, a great series of buildings within which are two large courts, is now devoted to a museum which comprises splendid collections of sculpture, paintings, engravings, bronzes, pottery, Egyptian and Assyrian antiquities, etc. The palace of the Tuileries was set on fire in 1871 by the Communists. The ruins have been removed, but a few of the architectural details have been preserved. The Palais du Luxembourg, on the south side of the river, has very extensive gardens attached to it, and contains the Musée du Luxembourg, appropriated to the works of modern French artists. The Palais Royal is a famed resort. The Palais de l'Elysée, situated in the Rue St. Honoré, with a large garden, is now the residence of the president of the republic. The Chambre des Députés—known under the Empire as the Palais du Corps Législatif—is the building in which the deputies meet. The Palais de l'Industrie, built for the first international exhibition in 1855, is used for the annual salon of modern paintings, etc. The Hôtel de Ville is situated in the Place de l'Hôtel de Ville, formerly Place de Grève, on the right bank of the river. It was destroyed by the Communists in 1871, but has now been re-erected on the same site with even greater magnificence. It is a very rich example of Renaissance architecture. The Hôtel des Invalides, built in 1670, is now used as a retreat for disabled soldiers, and is capable of accommodating 5000. The church attached has a lofty and finely-proportioned dome. It contains the burial-place of the first Napoleon. The Palais de Justice is an irregular mass of buildings occupying the greater part of the western extremity of the Ile de la Cité. Opposite the Palais de Justice is the Tribunal de Commerce, a quadrangular building inclosing a large court roofed with glass. The mint (Hôtel des Monnaies) fronts the Quai Conti, on the south side of the Seine, and contains an immense collection of coins and medals. The other principal government buildings are the treasury (Hôtel des Finances), in the Rue de Rivoli; the record office (Hôtel des Archives Nationales). The Exchange (La Bourse) was completed in 1826; it is in the form of a parallelogram, 212 feet by 126 feet, surrounded by a range of sixty-six columns. The extensive markets form a striking feature of Paris, the most important being the Halles Centrales, where fish, poultry, butcher-meat and garden produce are sold. A notable and unique structure is the Eiffel Tower,

built in connection with the Paris Exhibition of 1889. It is a structure of iron lattice-work 984 feet high, and having three stages or platforms. It is as yet the highest building in the world.

The chief institution of higher education is the academy of the Sorbonne, where are the university "faculties" (see France, section Education) of literature and science, while those of law and of medicine are in separate buildings. There are, besides, numerous courses of lectures in science, philology, and philosophy delivered in the Collège de France, and courses of chemistry, natural history, etc., in the museum of the Jardin des Plantes. Of the libraries the most important is the Bibliothèque Nationale, the largest in the world. The number of printed volumes which it contains is estimated at 2,500,000, besides, 3,000,000 pamphlets, manuscript volumes, historical documents, etc. Among other libraries are those of the Arsenal, St. Geneviève, Mazarin, De la Ville, De l'Institut, and De l'Université (the Sorbonne).

There are many hospitals in Paris devoted to the gratuitous treatment of the indigent sick and injured; and also numerous establishments of a benevolent nature, such as the Hôtel des Invalides, or asylum for old soldiers, the lunatic asylum (Maison des Aliénés, Charenton), blind asylums; the deaf and dumb institute (Institution des Sourds-Muets); two hospitals at Vincennes for wounded and convalescent artisans; the crèches, in which infants are received for the day at a small charge; and the *ouvroirs*, in which aged people are supplied with work.

The theaters of Paris are more numerous than those of any other city in the world. The most important are the Opera House, a gorgeous edifice of great size, built between 1861-75; the Théâtre Français; the Odéon; the Théâtre de la Gaîté, for vaudevilles and melodramas; Théâtre des Folies Dramatiques, Théâtre du Châtelet, Théâtre du Vaudeville, Théâtre des Variétés, Théâtre de la Porte St. Martin, and the Théâtre de l'Ambigu Comique.

The most important manufactures are articles of jewelry and the precious metals, trinkets of various kinds, fine hardware, paper-hangings, saddlery and other articles in leather, cabinet-work, carriages, various articles of dress, silk and woolen tissues, particularly shawls and carpets, Gobelin tapestry, lace, embroidery, artificial flowers, combs, machines, scientific instruments, types, books, engravings, refined sugar, tobacco (a government monopoly), chemical products, etc. That which is distinctively Parisian is the making of all kinds of small ornamental articles, which are called articles de Paris. A large trade is carried on by the Seine both above and below Paris as well as by canals.

The first appearance of Paris in history is on the occasion of Cæsar's conquest of Gaul, when the small tribe of the Parisii were found inhabiting the banks of the Seine, and occupying the island now called Ile de la Cité. It was a fortified town in 360 A.D., when the soldiers of Julian here summoned him to

fill the imperial throne. In the beginning of the 5th century it suffered much from the northern hordes, and ultimately fell into the hands of the Franks, headed by Clovis, who made it his capital in 508. In 987 a new dynasty was established in the person of Hugo Capet, from whose reign downward Paris long continued to be the residence of the kings of France. In 1437 and 1438, under Charles VII., Paris was ravaged by pestilence and famine, and such was the desolation that wolves appeared in herds and prowled about the streets. Under Louis XI. a course of prosperity again commenced. In the reign of Louis XIV. the Paris walls were leveled to the ground after having stood for about 300 years, and what are now the principal boulevards were formed on their site (1670). Only the Bastille was left (till 1789), and, in place of the four principal gates of the old walls, four triumphal arches were erected, two of which, the Porte St. Denis and Porte St. Martin, still stand. Many of the finest edifices of Paris were destroyed during the revolution, but the work of embellishment was resumed by the directory, and continued by all subsequent governments. The reign of Napoleon III. is specially noteworthy in this respect; during it Paris was opened up by spacious streets and beautified to an extent surpassing all that had hitherto been effected by any of his predecessors. Among modern events in the history of Paris are the siege of the city by the Germans in the war of 1870-71, and the subsequent siege by the French national government in order to wrest the city from the hands of the Commune. Paris was the scene of international exhibitions in 1855, 1867, 1878, and 1889, but the greatest was that of 1900, which presented an epitome of the progress of the nineteenth century. It was visited by 47,000,000 persons, or about two-thirds more than the number who visited that of 1889. Pop. 2,750,000.

PARIS, in Greek mythology, also called Alexander, the second son of Priam, king of Troy, by Hecuba. His mother dreamed before his birth that she had brought forth a firebrand, which was interpreted to mean that he would cause the destruction of Troy. To prevent this the child was exposed on Mount Ida, where he was discovered by a shepherd, who brought him up as his own son. Here his grace and courage commended him to the favor of Ceneone, a nymph of Ida, whom he married. At the marriage of Peleus and Thetis a dispute arose whether Hera, Athena, or Aphroditë was the most beautiful, and as such entitled to the golden apple. Paris was chosen judge, and decided in favor of Aphroditë, who had promised him the fairest woman in the world for his wife. Subsequently he visited Sparta, the residence of Menelaus, who had married Helena (or Helen), the fairest woman of the age, whom he persuaded to elope with him. This led to the siege of Troy, at the capture of which he was killed by an arrow.

PARIS, Louis Albert Philippe d'Orleans, Comte de, son of the Duc d'Orleans, and grandson of Louis-Philippe,

born 1838. After the revolution of 1848 he resided chiefly in Claremont, England, where he was educated by his mother. During the American civil war of 1861 he, along with his brother the Duc de Chartres, volunteered into the northern army, and served for some time on the staff of General McClellan. On his return to Europe the following year he married his cousin the Princess Marie-Isabelle, eldest daughter of the Duc de Montpensier. After the Franco-German war he was admitted a member of the first national assembly. On the death of the Comte de Chambord, the Comte de Paris was recognized as head of the royal house of France. Under the expulsion bill of 1886 he, along with the other royal princes, was forbidden to enter France. He published a history of the Civil War in America, and a work on English Trade-unions. He died in 1894.

PARIS, the capital of Lamar co., Tex., on the Gulf, Col. and S. Fé, the St. L. and San. Fran., and the Tex. and Pac. railways; 15 miles s. of the Red river, 64 miles, e. of Sherman. It is in a wheat and cotton growing region and is the trade center of a large territory. Pop. 11,410.

PARIS, Treaties of, of the numerous treaties bearing this designation a few only of the most important can be mentioned here. On February 10, 1763, a treaty of peace was signed between France, Spain, Portugal, and England, in which Canada was ceded to Great Britain. On February 6, 1778, was signed that between France and the United States, in which the independence of the latter country was recognized. A treaty was signed between Napoleon I. and the allies, ratified April 11, 1814, by which Napoleon was deposed and banished to Elba. The treaty for the conclusion of peace between Russia on the one hand, and France, Sardinia, Austria, Turkey, and Great Britain on the other, at the end of the Crimean war, was ratified March 30, 1856. Lastly, the treaty of peace with Germany, at the end of the Franco-German war, was concluded May 10, 1871, and modified by the convention of October 12, 1871.

PARIS, University of, came into existence in the beginning of the 13th century, and was long the most famous center of learning in Europe. It was suppressed in 1793 along with the other French universities, a new system being then introduced. It had long ceased, however, to maintain its old position. See France.

PARIS BASIN, in geology, the great area of tertiary strata on which Paris is situated. Besides a rich fossil fauna of marine and fresh-water mollusca, the remains of mammals are abundant and interesting.

PARIS BLUE, a bright blue obtained by exposing a mixture of rosaniline, ten times its weight of aniline, and some benzoic acid to a temperature of 180° C.

PARIS GREEN, a preparation of copper and arsenic employed in making artificial flowers, in wall-papers, etc. It is a virulent poison.

PARK, Mungo, African traveler, born near Selkirk in Scotland 1771, died 1806. He was educated at Edin-

burgh for the medical profession; received an appointment as assistant-surgeon on board an East Indiaman and made a voyage to India. Returning to England in 1793 he was engaged by the African Society to trace the course of the Niger. He reached the Gambia at the end of 1795, and advancing north-eastward arrived at the Niger near Segou. After exploring part of the course of the river he returned home, and published his *Travels in the Interior of Africa* in 1799. He settled at Peebles as a country doctor, but in 1805 accepted command of a government expedition to the Niger. Having advanced from Pisanía on the Gambia to Sansanding on the Niger, he built a boat at the latter place, with the intention of following the Niger to the sea. It was afterward ascertained that the expedition advanced down the river as far as Boussa, where it was attacked by the natives. It is supposed that Mungo Park was drowned in his efforts to escape. The *Journal of his second expedition as far as the Niger* was published in 1815.

PARKER, Theodore, American divine, son of a Massachusetts farmer, born at Lexington 1810, died at Florence 1860. He studied at Harvard University, and in 1837 was settled as a Unitarian preacher at West Roxbury. Although his doctrine was accounted heterodox, yet such was his eloquence and ability that he soon became famous as a preacher and lecturer throughout New England. In 1843 he visited England, France, Italy, and Germany, and settled as a preacher in Boston on his return. He was a prominent advocate of the abolition of slavery. The principal of his published works are: *Occasional Sermons and Speeches*; and *Sermons on Theism, Atheism, and the Popular Theology*.

PARKERSBURG, the capital of Wood co., W. Va., at the confluence of the Ohio and the Little Kanawha rivers; on the Balt. and O., the Balt. and O.S. W., and the Ohio River railways; 96 miles s. by w. of Wheeling. It is in a rich oil and natural-gas region. Pop. with suburbs, 15,210.

PARKES, Sir Henry, son of a Warwickshire farmer, born 1815; emigrated to Sydney in 1839, and entered the New South Wales Parliament in 1854. He became colonial secretary in 1866, and prime minister in 1872-75, and several times subsequently. He was author of the N.S. Wales public schools act, and advocated free-trade, Australian federation, and imperial federation. He died in 1896.

PARKHURST, Charles Henry, an American Presbyterian clergyman, pastor of the Madison Square Presbyterian church, New York, and noted reformer. Dr. Parkhurst was born in Massachusetts and graduated from Amherst college in 1866. His first charge was as pastor of the Lenox (Mass.) Congregational church. In 1891 he became prominent as a prosecutor of vice in New York City and his investigations brought about the appointment of the Lexow committee in 1894. He is a dramatic preacher and an able lecturer.

PARKMAN, Frances, American historian, was born in Boston in 1823.

He selected as his life work the writing of the rise, decline and fall of the French power in America. His works include *The Conspiracy of Pontiac*, *Pioneers of France in the New World*, *The Jesuits in North America*, *La Salle and the Discovery of the Great West*, *The Old Regime in Canada*, *Count Frontenac and New France Under Louis XIV.*, and *Montcalm and Wolfe*. He died in 1893.

PARLIAMENT, the supreme legislative assembly and court of law in Britain. See Britain.

PARMA, a city of North Italy, capital of the province of Parma, on the small river Parma, 72 miles southeast of Milan. The manufactures are of silk, cottons, woollens, felt-hats, etc. Pop. 49,370.—The province lies on the right bank of the Po; area, 1235 sq. miles; pop. 277,842.

PARMESAN CHEESE, a cheese made of skimmed milk in the neighborhood of Parma by a peculiar process, flavored with saffron, and celebrated for its keeping qualities. Indeed, it becomes so hard as to require to be grated when used.

PARNAS'SUS, or **LIAKU'RA**, a mountain of Greece, situated in Phocis, 65 miles northwest of Athens. It has two



Rev. Charles H. Parkhurst.

prominent peaks, one of which was dedicated to the worship of Bacchus and the other to Apollo and the Muses, while on its southern slope was situated Delphi and the Castalian fount. Its height is 8068 feet, and a magnificent view is obtained from its top.

PARNELL, Charles Stewart, born at his father's estate of Avondale, co. Wicklow, Ireland, in 1846. He became member of parliament for Meath in 1875; organized the "active" Home Rule party, and developed its obstruction tactics; and in 1879 formally adopted the policy of the newly-formed Land League, was an active member of it, and was chosen president of the organization. At the general election of 1885 he was re-elected for Cork, and

next year he and his followers supported the Home Rule proposals introduced by Mr. Gladstone, while he also brought in a bill for the relief of Irish tenants that was rejected. He made a disgraceful appearance in a divorce case, and was cast off by the Gladstonian party, and denounced by the Irish priesthood. He died in 1891.

PAR'ODY, a kind of literary composition, usually in verse, in which the form and expression of grave or serious writings are closely imitated, but adapted to a ridiculous subject or a humorous method of treatment.

PAROLE', a promise given by a prisoner of war that he will not try to escape if allowed to go about at liberty; or to return, if released, to custody at a certain time if not discharged; or not to bear arms against his captors for a certain period; and the like.

PAROTID GLAND, in anatomy, one of the salivary glands, there being two parotids, one on either side of the face, immediately in front of the external ear, and communicating with the mouth by a duct.

PAR'QUETRY, a species of inlaid woodwork in geometric or other patterns, and generally of different colors, principally used for floors.

PARR, Catharine. See Catharine Parr.

PARROT, a name common to birds of the family of climbers. The bill is hooked and rounded on all sides, and is much used in climbing. The tarsi are generally short and strong, the toes being arranged two forward and two backward. The tongue, unlike that of most other birds, is soft and fleshy



Gray parrot.

throughout its whole extent. The wings are of moderate size, but the tail is often elongated, and in some cases assists in climbing. The plumage is generally brilliant. Parrots breed in hollow trees, and subsist on fruits and seeds. Several species can not only imitate the various tones of the human voice, but also exercise in some cases actual conversational powers. Some live to a great age, instances being known of these birds reaching seventy and even ninety years. The species are numerous, and are known under the various names of parrots, parakeets, macaws, lorikeets, lories, and cockatoos, the name parrot, when used dis-

tinctively, being generally applied to species of some size, that have a strongly hooked upper mandible and a tail short or of medium length. They are natives of both tropical and sub-tropical regions, and even extend northward into the United States, and south to the Straits of Magellan, New Zealand, and Tasmania. The best-known species is the gray parrot of Western Africa, which can be most easily trained to talk. The green parrots are also common as domestic pets, being brought from the



Psittacidæ.

- 1, Head and foot of macaw. 2, Do. of blue-bellied lorikeet. 3, Do. of Goliath aratoo. 4, Head of gray parrot.

tropical regions of South America. The Carolina parrot is found in the United States, and is gregarious in its habits.

PARSEES', the name given in India to the fire-worshipping followers of Zoroaster, chiefly settled in Bombay, Surat, etc., where they are among the most successful merchants. They have a great reverence for fire in all its forms, since they find in it the symbol of the good deity Ahurâ-Mazda (Ormuzd). To this divinity they have dedicated "fire-temples," on whose altar the sacred flame is kept continually burning. Benevolence is the chief practical precept of their religion, and their practice of this finds its evidence in their many charitable institutions. One of the most curious of their customs is in the disposal of their dead. For this they erect what are called "towers of silence," built of stone, about 25 feet high, and with a small door to admit the corpse. Inside is a large pit with a raised circular platform round it on which the body is exposed that it may be denuded of flesh by vultures, after which the bones drop through an iron grating into the pit below. The number of Parsees in India at last census was 94,190.

PARSLEY, a plant, one species of which, the common parsley, is a well-known garden vegetable, used for communicating an aromatic and agreeable flavor to soups and other dishes.

PARSNIP, a plant of which there are many varieties. It is a tall erect plant, with pinnate leaves and bright-yellow flowers, and much cultivated for its roots, which have been used as an esculent from a very early period. They are also cultivated as food for the use of cattle.

PARSON, in English ecclesiastical law, is the rector or incumbent of a parish; also, in a wider sense, any one that has a parochial charge or cure of souls. Four requisites are necessary to constitute a parson, viz. holy orders, presentation, institution, and induction. His duties consist chiefly of performing divine service and administering the sacraments.

PAR'THENON, a celebrated Grecian temple of Athena, on the Acropolis of Athens, one of the finest monuments of ancient architecture. It is built of marble, in the Doric style, and had originally 8 columns on each of the two fronts, with 17 columns on the sides, or 46 in all, of which 32 are still standing; length 228 feet, breadth 101, and height to the apex of the pediments 64 feet; height of columns 34 feet 3 inches. The pediments were filled with large statues, the metopes adorned with sculptures in relief. After serving as a Christian church and as a mosque, it was rendered useless for any such pur-



Southwest angle of the Parthenon, from the Museum hill.

pose in 1687 by the explosion of a quantity of gunpowder which the Turks had placed in it during the siege of Athens by the Venetians. Though the more precious pieces of sculpture have been dispersed among various European collections the Parthenon still bears an imposing aspect.

PARTICIPLE, in grammar, a part of speech, so called because it partakes of the character both of a verb and an adjective. The participle differs from the adjective in that it implies time, and therefore applies to a specific act, whereas the adjective designates only an attribute, as an habitual quality or characteristic, without regard to time. When we say, "he has learned his lesson," we have regard to a specific act done at a certain time; but in the phrase "a learned man," learned designates an habitual quality. In the former case learned is a participle; in the latter, an adjective. There are two participles in English: the present—ending in -ing, and the past—ending, in regular verbs, in -ed.

PARTICLES, such parts of speech as are incapable of any inflection, as, for

instance, the preposition, conjunction, etc.

PARTNERSHIP is the association of two or more persons for the purpose of undertaking and prosecuting conjointly any business, occupation, or calling; or a voluntary contract by words or writing, between two or more persons, for joining together their money, goods, labor, skill, or all or any of them, upon an agreement that the gain or loss shall be divided in certain proportions among them, depending upon the amount of money, capital stock, etc., furnished by each partner. Partnership may be constituted by certain acts connected with the undertaking apart from any deed or oral contract. The duration of the partnership may be limited by the contract or agreement, or it may be left indefinite, subject to be dissolved by mutual consent. The members of a partnership are called nominal when they have not any actual interest in the trade or business, or its profits; but, by allowing their names to be used, hold themselves out to the world as apparently having an interest; dormant or sleeping, when they are merely passive in the firm, in contradistinction to those who are active and conduct the business as principles, and who are known as ostensible partners. A partnership may be limited to a particular transaction or branch of business, without comprehending all the adventures in which any one partner may embark, but such reservation must be specified in the deed of contract. For in the usual course each member of a partnership is liable at common law for the debts of the firm, and a sleeping partner is responsible for all debts of the firm which have been contracted during his partnership. Each partner may also sue the firm as if it were a distinct person, and the firm may be made bankrupt without the goods of any of the partners being sequestered. The partners are, however, liable jointly and severally to creditors in payment of its debts.

PARTRIDGE, William Ordway, American sculptor and author, born in Paris in 1861. He was educated at Columbia university, in New York City, and studied modeling under Galli in Florence, and Welonski in Rome. Some of his larger works are the bronze statue of Hamilton in front of the Hamilton Club, Brooklyn, N. Y., Shakespeare in Lincoln Park, Chicago, and the equestrian statue of General Grant in Brooklyn. His publications include: *Art for America*; *Song Life of a Sculptor*, *The Technique of Sculpture*, *The Angel of Clay*, a novel; and *Nathan Hale*. For a time he was professor of fine arts at Columbian University, Washington, D. C.

PARTRIDGE, a well-known rasorial bird of the grouse family. The common partridge occurs in nearly all parts of Europe, in North Africa, and in some parts of Western Asia. The wings and tail are short, the tarsi as well as the toes naked, and the tarsi not spurred. The greater part of the plumage is ash-gray finely varied with brown and black. They feed on grain and other seeds, insects and their larvæ and pupæ. The name partridge is applied in the United

States to several North American species of quails.

PARTRIDGE-BERRY, a plant inhabiting North America, also known as wintergreen. The name is also applied to another North American shrub, a



Red-legged partridge.

pretty little trailing plant, with white, fragrant flowers and scarlet berries, natural order Rubiaceæ.

PARTS OF SPEECH are the classes into which words are divided in virtue of the special functions which they discharge in the sentence. Properly speaking there are only seven such classes, namely the noun, adjective, pronoun, verb, adverb, preposition, and conjunction; for the article, which is usually classed as a separate part of speech, is essentially an adjective, while the interjection can hardly be said to belong to articulate speech at all. Each of the parts of speech will be found separately treated under their several heads throughout the work.

PASADENA, city in Los Angeles co., Cal., on the Los Angeles Terminal and the Southern Pac. railways; 9 miles n.e. of Los Angeles. It is at the foot of the Sierra Madre Mountains, at an elevation of 850 feet above sea-level, and is in the beautiful San Gabriel valley, noted for its orange and lemon groves and the cultivation of smaller fruit. Pop. 11,215.

PASCAL, Blaise, a French philosopher and mathematician, born at Clermont, in Auvergne, 1623, died 1662. In early youth he showed a decided inclination for geometry, and so rapid was his advance that while yet in his sixteenth year he wrote a treatise on conic sections, which received the astonished commendation of Descartes. His studies in languages, logic, physics, and philosophy were pursued with such assiduity that his health was irrecoverably gone in his eighteenth year. In 1647 he invented a calculating machine, and about the same time he made several discoveries concerning the equilibrium of fluids, the weight of the atmosphere, etc. He now came under the influence of the Jansenists Arnauld and others, and from 1654 he lived much at the monastery of Port Royal, and partly accepted its rigorous rule, though he never actually became a solitaire. About 1655 he wrote, in defense of his Jansenist friend Arnauld, his famous Provincial Letters (*Lettres Ecrites par Louis de Montalte à un Provincial de ses Amis*), and after his death his *Pensées* or *Thoughts* were published as the fragments of an unfinished apology for Christianity.

PAS-DE-CALAIS (pä-dê-kâ-lâ), a maritime department of Northern France;

area, 2550 sq. miles. The principal harbors are Boulogne and Calais. The chief minerals are indifferent coal, good pipe and potter's clay, and excellent sandstone. There are numerous iron-foundries, glass-works, potteries, tanneries, bleach-works, mills, and factories of all kinds. The capital is Arras. Pop. 955,391.

PASHA, in Turkey, an honorary title originally bestowed on princes of the blood, but now conferred upon military commanders of high rank and the governors of provinces. There are three grades, each distinguished by a number of horse-tails waving from a lance, the distinctive badge of a pasha. Three horse-tails are allotted to the highest dignitaries; the pashas of two tails are generally the governors of the more important provinces; and the lowest rank, of one tail, is filled by minor provincial governors.

PASSAIC, a city in Passaic co., N. J., on the Passaic river, and the Erie, the Del., Lack. and W., and Susquehanna railways; 5 miles s.e. of Paterson, the county seat, 12 miles n.w. of New York City. Pop. 30,125.

PASSAGE, Birds of. See Migration.

PASSENGER PIGEON, a bird of the pigeon family, which abounds in America. It is distinguished from the common pigeon chiefly by its long graduated tail. It is about 15 inches in length, with finely-tinted plumage, small head, and long wings. The multiplication of these pigeons is so rapid, and their destructive power so great, that they are obliged to migrate from place to place in vast flocks to obtain their food. They fly in dense columns at a great height, and such a column, one mile broad and 140 miles long, has been observed. The larger breeding-places are said to cover a forest area of about 40 miles.

PASSENGERS, in law, the railway and other public carriers contract to carry passengers without any negligence on their (the carriers') part. In case of accident it lies on the carrier to show that it was from no fault or negligence on his part, or on the part of his servants, that the accident occurred. Hence all passengers injured (or in case of death their nearest relatives) have a claim for compensation, unless it can be proved that the accident was due to the fault of the passenger. Passengers by sea are carried subject to the same general law as those by land: the carriers are bound to observe all due precautions to prevent accident or delay.

PASSION, The, a name for the crucifixion of Jesus and its attendant sufferings.

PASSION-FLOWER, a large genus of twining plants. They are all twining plants, often scrambling over trees to a considerable length, and in many cases are most beautiful objects, on account of their large, rich, or gaily-colored flowers, which are often succeeded by orange-colored edible fruits, for which indeed they are chiefly valued in the countries where they grow wild.

PASSIONISTS, a religious order in the Church of Rome, founded in 1737. The members practice many austerities; they go bare-footed, rise at midnight to

recite the canonical hours, etc. It is also known as the Order of the Holy Cross and the Passion of Christ.

PASSION-PLAY, a mystery or miracle play representing the different scenes in the passion of Christ. The passion play is still extant in the periodic representations at Oberammergau.

PASSION-WEEK. See Holy Week.

PASSIVE, in grammar, a term applied to certain verbal forms or inflections expressive of suffering or being affected by some action, or expressing that the nominative is the object of some action or feeling; as, she is loved and admired.

PAS'SOVER, a feast of the Jews, instituted to commemorate the providential escape of the Hebrews in Egypt, when God, smiting the first-born of the Egyptians, passed over the houses of the Israelites, which were marked with the blood of the paschal lamb. It was celebrated on the first full moon of the spring, from the 14th to the 21st of the month Nisan, which was the first month of the sacred year. During the eight days of the feast the Israelites were permitted to eat only unleavened bread, hence the passover was also called the "feast of unleavened bread." Every householder with his family ate on the first evening a lamb killed by the priest, which was served up without breaking the bones. The passover was the principal Jewish festival.

PASSPORT, a warrant of protection and authority to travel, granted to persons moving from place to place, by a competent authority. In some states no foreigner is allowed to travel without a passport from his government, and in all cases the visitor to the continent of Europe is wiser to provide himself with one, if only as a means of identification. In Russia, and Turkey in particular, a passport is indispensable.

PASTA, Giuditta, operatic singer, born at Como, near Milan, in 1798, of Jewish parents, died 1865. She appeared at first without success, but in 1819-22 her reputation steadily increased, and up till 1833 she held one of the foremost places on the lyric stage, which she then quitted. She was specially distinguished in the tragic opera; Bellini wrote for her his *Norma* and *Sonnambula*, and she made the roles of *Medea*, *Desdemona*, and *Semiramide* her own.

PASTE, a composition in which there is just sufficient moisture to soften without liquefying the mass, as the paste made of flour used in cookery. The term is also applied to a highly refractive variety of glass, a composition of pounded rock-crystal melted with alkaline salts, and colored with metallic oxides: used for making imitation gems.

PASTEL, or **PASTIL**, a colored crayon. Pastel painting. See Crayon.

PASTER, the part of a horse's leg between the joint next the foot and the coronet of the hoof; it answers to the first phalanx of a man's finger.

PASTEUR (päs-teur), Louis, French chemist and bacteriologist, born at Dôle, Jura, 1822, died 1895; educated chiefly at the Ecole Normale, Paris, where in 1847 he took his degree as doctor. The following year he was appointed professor of physics in Stras-

burg, where he devoted much research to the subject of fermentation; in 1857 he received the appointment of dean in the Faculty of Sciences, Lille; in 1863 he became professor of geology, chemistry, and physics at the Ecole des Beaux-Arts, Paris; and in 1867 professor of chemistry at the Sorbonne. He became a member of the French academy in 1882. He has been especially successful in proving the part played by microbes in fermentation and decomposition, in introducing a successful treatment of disease in silkworms



M. Louis Pasteur.

and cattle, and has achieved great success in his efforts to check hydrophobia by means of inoculation. To enable him to deal with this disease under the best conditions a Pasteur Institute was opened in Paris, where patients are received from all parts of Europe. Pasteur Institutes have also been opened in many of the large cities of the Union. See Hydrophobia.

PASTORAL POETRY, poetry which deals, in a more or less direct form, with rustic life. It has generally flourished in highly-corrupted artificial states of society. Thus it was that Theocritus, the first pastoral poet, made artistic protest against the licentiousness of Syracuse; and Virgil wrote his *Bucolics* and *Eclogues* in the corrupt Roman court. In the 16th century pastoral poetry received its most notable expression in the *Arcadia* of G. Sannazaro, the *Aminta* of Tasso, and the *Pastor Fido* of Guarini. This tendency, which was so potent in Italy, spread to England, and influenced the *Shepherd's Calendar* of Spenser, the *Arcadia* of Sidney, the *Faithful Shepherdess* of Fletcher, *As You Like It* of Shakespeare, and the *Comus* of Milton.

PASTURES, land under grass and herbage, which is eaten as it grows by horses, oxen, sheep, and other herbivorous animals. First-class pastures are used for feeding heavy oxen; second class for inferior or dairy cattle; while hill-sides, moors, and uplands are utilized for sheep.

PATA'GIUM is the name applied to the expansion of the skin or integumentary membrane by means of which bats, flying squirrels, flying lizards, and other semi-aerial forms support themselves in the air. This membrane is not a true wing, but is used as a kind of parachute for temporary support.

PATAGO'NIA, is the name applied to that extreme portion of South America which is bounded e. by the Atlantic, w. by the Pacific, s. by the Strait of Magellan, and n. by the Rio Negro. Since 1881 this large territory has been, by treaty, divided between Chile and the Argentine Republic, so that the portion west of the Andes (63,000 sq. miles) belongs now to the former, and the portion east of the Andes (360,000) belongs to the latter. The Straits of Magellan form a southern boundary of 360 miles, and separate the mainland from the innumerable islands of Tierra del Fuego. Here the Chilean government have established the settlement of Punta Arenas, with stations along the coast. The Patagonians are a tall, muscular race averaging fully 6 feet in height, with black hair, thick lips, and skin of a dark-brown color. They are a nomad race, divided into numerous tribes, whose chief occupation is in hunting and cattle-breeding.



Patagonians.

This native population, however, never numerous, is rapidly disappearing. Colonization is encouraged by the Argentine government, and there are many tracts suitable for European settlement. The country was first discovered by Magellan in 1520.

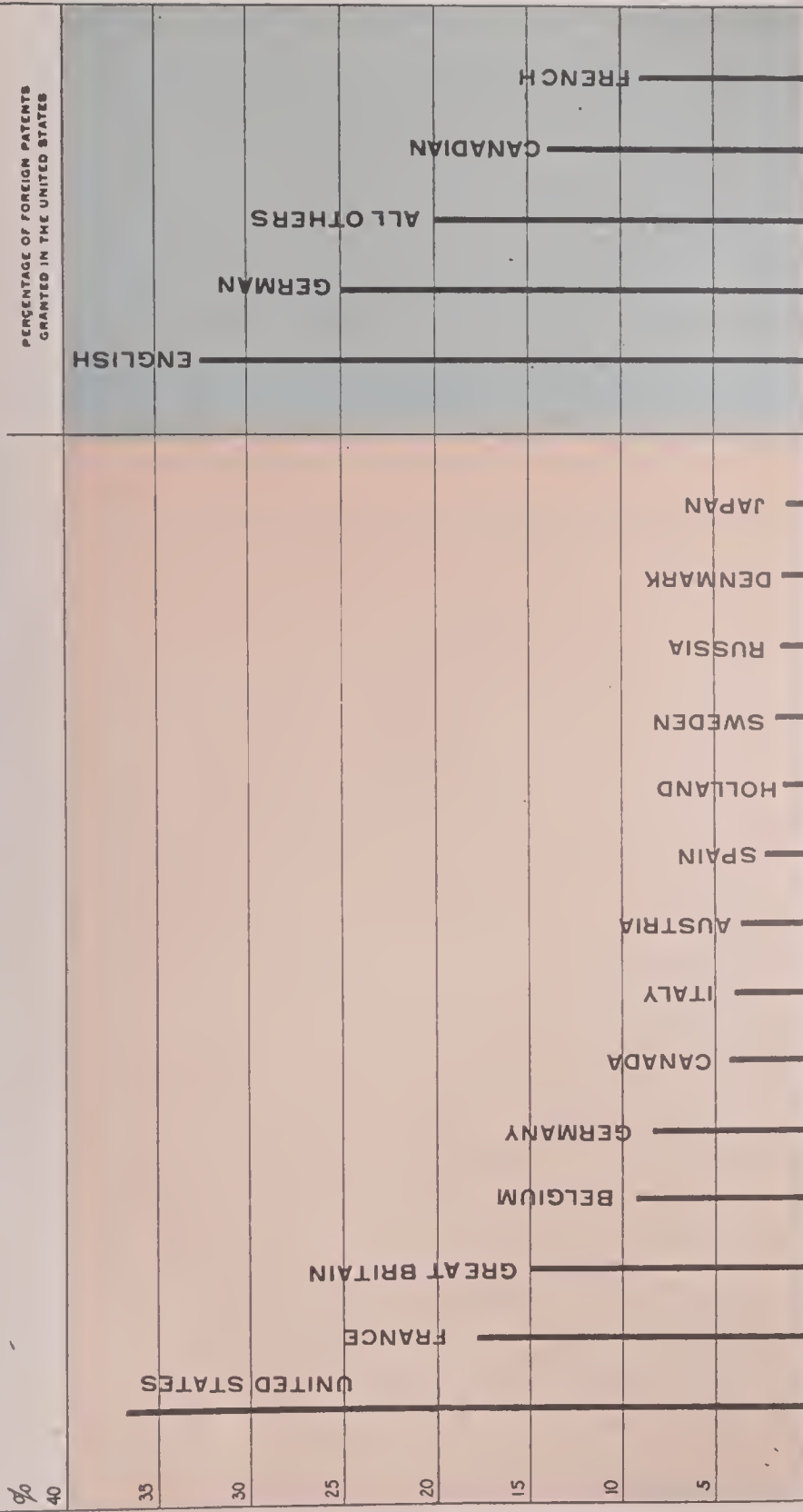
PATE DE FOIE GRAS (pä-tä də fwä gra), a dish made from the enlarged livers of overfed geese, and much relished by epicures. It is made in the form of a pie, and from its oily nature is very indigestible.

PATEL'LA, the name applied in anatomy to the "knee-cap" or "kneecap," the sesamoid bone of the knee.—The name is also applied to a genus of gasteropodous molluscs comprising the limpets.

PAT'ENT, a privilege from the government, granted by letters patent (whence the name), conveying to the individual or individuals specified therein the sole right to make, use, or dispose of some new invention or discovery for a certain limited period, which in the United States may run to seventeen years should the inventor be able to prove that the invention, though of great public utility, has been up till that time almost unprofitable to him. Letters patent are obtained upon application to

PATENTS OF THE WORLD

PERCENTAGE OF TOTAL NUMBER OBTAINED BY INVENTORS OF EACH NATION



APPLICATIONS FOR PATENTS.

[Condensed from Rules of Practice in the United States patent office.]

A patent may be obtained by any person who has invented or discovered any new and useful art, machine, manufacture or composition of matter, or any new and useful improvement thereof not previously patented or described in this or any other country, for more than two years prior to his application, unless the same is proved to have been abandoned. A patent may also be obtained for any new design for a manufacture, bust, statue, alto-relievo or bas-relief for the printing of woolen, silk or other fabrics; for any new impression, ornament, pattern, print or picture to be placed on or woven into any article of manufacture; and for any new, useful and original shape or configuration of any article of manufacture, upon payment of fees and taking the other necessary steps.

Applications for patents must be in writing, in the English language and signed by the inventor if alive. The application must include the first fee of \$15; a petition, specification and oath, and drawings, model or specimen when required. The petition must be addressed to the commissioner of patents and must give the name and full address of the applicant, must designate by title the invention sought to be patented, must contain a reference to the specification for full disclosure of such invention and must be signed by the applicant.

The specification must contain the following in the order named: Name and residence of the applicant with title of the invention; a general statement of the object and nature of the invention; a brief description of the several views of the drawings (if the invention admits of such illustration); a detailed description; claim or claims; signature of inventor and signatures of two witnesses. Claims for a machine and its products and claims for a machine and the process in the performance of which the machine is used must be presented in separate applications, but claims for a process and its product may be presented in the same application.

The applicant, if the inventor, must make oath or affirmation that he believes himself to be

the first inventor or discoverer of that which he seeks to have patented. The oath or affirmation must also state of what country he is a citizen and where he resides. In every original application the applicant must swear or affirm that the invention has not been patented to himself or to others with his knowledge or consent in this or any foreign country for more than two years prior to his application, or on an application for a patent filed in any foreign country by himself or his legal representatives or assigns more than seven months prior to his application. If application has been made in any foreign country full and explicit details must be given. The oath and affirmation may be made before any one who is authorized by the laws of his country to administer oaths.

Drawings must be made on white paper with India ink and the sheets must be exactly 10 1/2 inches in size, with a margin of one inch. They must show all details clearly and without the use of superfluous lines.

Applications for reissues must state why the original patent is believed to be defective and tell precisely how the errors were made. These applications must be accompanied by the original patent and an offer to surrender the same, or, if the original be lost, by an affidavit to that effect and certified copy of the patent. Every applicant whose claims have been twice rejected for the same reasons may appeal from the primary examiners to the examiners in chief upon the payment of a fee of \$10.

The duration of patents is for seventeen years except in the case of design patents, which may be for three and a half, seven or fourteen years as the inventor may elect.

Caveats or notices given to the patent office of claims to inventions to prevent the issue of patents to other persons upon the same invention, without notice to caveators, may be filed upon the payment of a fee of \$10. Caveats must contain the same information as application for patents.

the commissioner of patents, Washington, D. C., setting forth that the petitioner has, after great labor and expense, made a certain discovery which he describes, and which he believes will be of great public utility, and that he is the first inventor. The person applying for a patent must furnish a provisional specification along with his application, giving a general account of the nature of the article or invention he wishes to be patented. The application and specification are submitted to an examiner connected with the patent office, and if he report that everything is satisfactory and done in due form, the application is accepted, otherwise the party may have to make amendments in his application and specification. Before doing so, however, he is allowed to appeal to the commissioner of patents who decides the matter. Finally an appeal lies to the supreme court of the District of Columbia. The fee upon filing an application is \$15; on issuing the patent, \$20; on application for extension of a patent, \$50; on granting an extension \$50. A prior patent by the inventor in a foreign country does not debar him from receiving a patent in the United States, provided the application be made within seven months of the application for the foreign patent.

Where a person has made an invention, but has not completed the details to his satisfaction, or feels that he can improve on it, he may protect himself against a patent being granted meanwhile for the same thing, by filing a "caveat" in the patent office. A caveat is a notice which contains a description of the thing claimed as an invention, and concludes with a request that the inventor's rights be protected until he has completed his invention and has an opportunity to apply for a patent. A caveat is kept secret by the patent office, and entitles the caveator to notice of the filing of an interfering application for a period of one year. If such notice is sent him, the caveator, to retain his rights, must file his application, specifications, and, if necessary, models or samples, within three months thereafter. Where he does this his invention is considered to date back to the date of filing the caveat. When the rights of a patentee are being infringed he can protect them by a civil process at law, and his suit will be upheld if he can prove that the main elements of his invention have been infringed. A patent once granted can be revoked if anyone can show that the patentee is not the inventor. The patent laws vary considerably in foreign countries.

PATERNOSTER (Latin, "Our Father"), the opening words of the Latin version of the Lord's Prayer, hence employed to designate the prayer itself. See Lord's Prayer.

PAT'ERSON, the capital of Passaic co., New Jersey, on both sides of the Passiac, near its celebrated falls, and 16 miles northwest from New York. The town was founded in 1792, and now possesses numerous churches, a court-house, jail, library, etc. The falls, 72 feet high, are within the city limits and supply abundant water-power to the numerous cotton, silk, and woolen factories, dye and

print works, iron-foundries, machine-shops, tanneries, saw, paper, and fulling mills, etc. Pop. 120,114.

PATERSON, William, financier and founder of the Bank of England, was born in Dumfriesshire 1665, died in London 1719. He went through England as a pedlar, settled for a time at Bristol, subsequently resided in the Bahama Islands. Returning to London he engaged in trade with success, and in 1694 proposed and founded the Bank of England, being one of its first directors.

PATHOLOGY, that part of medicine which explains the nature of diseases, their causes and symptoms, comprehending nosology, etiology, and symptomatology. Pathology may be divided into general pathology, which regards what is common to a number of diseases taken as a class; and special pathology, which treats of individual diseases.

PATIA'LA, an Indian native state in the jurisdiction of the Punjab government, the larger part of which is situated south of the Sutlej and the other part in the hill country near Simla; area, 5887 sq. miles. Pop. of the state, 1,583,521. The capital is Patiala, 130 miles s.e. of Amritsir. It was founded in 1752 by Sardar Ala Singh, and has a pop. of 53,545.

PATNA, a city of Hindustan, in the lieutenant-governorship of Bengal. By reason of its central position and natural advantages the city is an important business center, and the chief seat of the opium trade. Pop. 134,785.—The district of Patna has an area of 2079 sq. miles, for the most flat and exceedingly fertile. The staple crop is rice, and the other products are wheat, barley, cotton, tobacco and sugar-cane. Pop. 1,623,856.

PATNA, a native state in the Central Provinces of India. Area 2400 sq. miles. It is now under direct British supervision. Pop. 277,566.

PATOIS (pá-twä), a French word of unknown origin used to denote a dialect spoken by the rustic, provincial, or uneducated classes.

PATRIARCHS are the antediluvian heads of families, and the three fathers of the Hebrew race, Abraham, Isaac and Jacob. The term at a later period became the title of the presidents of the sanhedrim, which exercised a general authority over the Jews of Syria and Persia after the destruction of Jerusalem. From them the title was adopted by the Christians, who applied it, from the beginning of the 5th century, to the bishops of Rome, Constantinople, Alexandria, Antioch, and Jerusalem. The Patriarch of Rome became the supreme pontiff of the west (see Popes), the four heads of the eastern church preserving the title of patriarch. The patriarch of Constantinople is the primate of the Greek church in the Ottoman empire, and bears the title of æcumenical.

PATRICIANS, the name given by the Romans to the members and descendants by blood or adoption of the original gentes, houses or clans who, after the plebians became a distinct order, constituted the aristocracy of the city and territory. See Rome.

PATRICK (Patricius), St., the apostle of Ireland, was born about 396 in the

British Roman province of Valentia, probably at Nemthur on the Clyde where Dumbarton now is. His father, a decurion in the Roman army, retired to a farm on the Solway, whence, at the age of sixteen, Patrick was carried off by a band of marauders and sold as a slave to the Irish Picts of county Antrim. After six years he made his escape, and, resolving to devote himself to the conversion of Ireland, prepared himself for the priesthood, probably at the monastic institution founded by St Ninian at Candida Casa (Whithorn) in Galloway. Having been ordained a bishop and received the papal benediction from Celestine I., he went over to Ireland about the year 432. Here he is said to have founded over 360 churches, baptized with his own hand more than 12,000 persons, and ordained a great number of priests. The date of his death is probably 469; it took place at a place called Saul, near Downpatrick, and his relics were preserved at Downpatrick till the time of the reformation. His authentic literary remains consist of his Confessions and a letter addressed to a Welsh chief named Corotic. The existence of two other Irish apostles, Patrick or Palladius, and Senn (old) Patrick, about the same time has caused much confusion in the history of the early Irish church.

PATRICK, St., Order of, an Irish order of knighthood, instituted in 1783 by George III., originally consisting of the sovereign, the lord-lieutenant of Ireland for the time being (who is the grandmaster of the order), and fifteen knights; but by a statute in 1833 the order was enlarged and the number of knights raised to twenty-two. The badge of the order is of gold, oval in shape, with the cross of St. Patrick surmounted by a shamrock in the center, and round this is a blue enamelled band bearing the motto "Quis separabit." The badge is suspended to a collar of roses and harps by means of an imperial crown and gold harp. The mantle and hood are of sky-blue tabinet, lined with white silk.

PATROL', a walking or marching round by a guard in the night to watch and observe what passes, and to secure the peace and safety of a garrison, town, camp, or other place; also, the guard or persons who go the rounds for observation.

PA'TRON, in the Roman republic, a patrician who had plebeians, called clients, under his immediate protection and whose interests he supported by his authority and influence. In later times the term patron was applied to every protector or influential promoter of the interests of others; hence the saints who were believed to watch over the interests of particular persons, places, or trades were called patron saints.

PATTI, Adelina Maria Clorinda, opera-singer, born at Madrid in 1843; received her musical training from her brother-in-law, Maurice Strakosch; made her first appearance in New York in 1859 as Lucia; and in 1861 made a brilliant début at Covent Garden, London, in the parts of Amina, Violetta, Zerlina, and Martha. Since then she has successfully established her reputation

as an artist in the chief cities of Europe and America. In 1868 she married the Marquis de Caux, but got divorce in 1883. In 1886 she married Signor Nicolini, and in 1899 Baron Cederström.

PATTISON, Mark, English writer, born in 1813, died in 1884. He was a contributor to the famous *Essays and Reviews*, and published an edition of Pope's *Epistles and Satires* (1869), a work on Isaac Casaubon (1875), a memoir of Milton in the *Men of Letters Series* (1879), the *Sonnets of Milton* (1883), and numerous articles in reviews, etc.

PAUL, the apostle, commonly called Saint Paul, was born of Jewish parents at Tarsus, in Cilicia, and inherited the rights of a Roman citizen. He received a learned education, and early went to Jerusalem to study under Gamaliel, one of the most celebrated Jewish rabbins. Thus prepared for the office of teacher, he joined the sect of the Pharisees, and became a persecutor of the Christians, to crush whom the sanhedrim employed him both in and out of Jerusalem. He was present at and encouraged the stoning of Stephen, and it was only when he was overtaken by a vision on his way to Damascus that he became a convert to Christianity. His sudden conversion was indicated by the change of his name from Saul to Paul, and he engaged in the work of an apostle with an ardor that overcame every difficulty. Arabia, Syria, Asia Minor, Greece, and the islands of the Mediterranean were the scenes of his labors. The churches of Philippi in Macedonia, of Corinth, Galatia, and Thessalonica, honored him as their founder; and he wrote epistles to these churches, and to the churches in the chief cities of Greece and Asia Minor. By admitting the Gentiles to the church he incurred the hatred of the Jews, who persecuted him as an apostate. Undismayed, the apostle went to Jerusalem and was there arrested and brought to Cæsarea, where he was kept a prisoner for two years by the Roman governors Festus and Felix. He appealed, as a Roman citizen, to the emperor; and on his way to Rome, where he arrived in the year 62, he was shipwrecked on the island of Melita. At Rome he was treated with respectful kindness, and there is reason to believe that he for some time regained his liberty. According to the tradition of the early church the apostle suffered martyrdom during the reign of Nero.

PAUL I., Emperor of Russia, son of Peter III. and Catharine II., was born in 1754. On the death of Catharine in 1796 he succeeded to the throne, and began his reign with acts of generosity. He put an end to the war with Persia, and liberated the Poles who were in confinement in Russia. He joined the coalition of crowns against France, and sent 100,000 men, under Suwaroff and Korsakoff, to Italy and Switzerland, and partly to Holland, but he afterward favored the cause of Napoleon. Paul caused himself to be declared grand-master of the Knights of Malta (1798), but Britain, having conquered the island in 1800, refused to surrender it to the Russian emperor. He therefore laid an embargo on all British ships in the

Russian ports, and prevailed upon the Swedish, Danish, and Prussian courts to enter into a convention against Great Britain. At length (1801) the internal administration and his increasing acts of tyranny gave rise to a strong popular discontent, and he was murdered in his bed March 24, 1801.

PAUL, St., Minnesota. See Saint Paul.

PAULDING, James Kirke, miscellaneous writer, born in Dutchess co., New York, 1779; died 1860. He removed to New York, where he became intimately acquainted with Washington Irving, and published in connection with him a series of humorous and satirical essays, entitled *Salmagundi*. For some years he was secretary of the United States navy. He published a second series of *Salmagundi*, entirely his own composition; several novels, among which are *Königsmarke*, and the *Dutchman's Fireside*; a *Life of Washington*; and many political pamphlets, poems, etc.

PAUL'S (St.) CATHEDRAL, London, is situated on Ludgate Hill, an elevation on the north bank of the Thames. The site of the present building was originally occupied by a church erected by Ethelbert, king of Kent, in 610. This was destroyed by fire in 1087, and another edifice, Old St. Paul's, was shortly afterward commenced. The structure was in the Gothic style, in the form of a Latin cross, 690 feet long, 130 feet broad, with a lead-covered wooden spire rising to the height of 520 feet. The middle aisle was termed Paul's Walk, from its being frequented by idlers as well as money-lenders and general dealers. Old St. Paul's was much damaged by a fire in 1137, by lightning in 1444, again by fire in 1561, and was utterly destroyed by the great fire in 1666. The ruins remained for about eight years, when the rebuilding was taken in hand by the government of Charles II. (1675-1710). The whole building was completed at a total cost of \$7,500,000 under one architect (Sir Christopher Wren), one master-mason (Thomas Strong), and one Bishop of London (Dr. Henry Compton). The building is of Portland stone, in the form of a cross. Its length is 510 feet; the width from north to south portico 282 feet; the general height is 100 feet. The whole is surmounted by a great dome raised on eight arches. Above the dome is a lantern or gallery terminated above by a ball and gilded cross, 404 feet from the pavement beneath. The elevated portico forming the grand entrance consists of twelve Corinthian columns, with an upper series of eight pillars of the composite order, supporting a pediment; the front being flanked by two bell-towers 120 feet in height. The entablature represents in relief the conversion of St. Paul, a work of Francis Bird. Upon the south front, which corresponds with the north, is a phoenix rising from the flames with the motto, "Resurgam" (I shall rise again). The pavement of the interior is composed of slabs of black and white marble. The crypt under the name contains the burying-places of many illustrious personages, and some interesting relics of old St. Paul's. Various decorative, structural and other improvements

have recently been made on the interior of the cathedral.

PAUNCEFOTE, Sir Julian, was born at Munich, Bavaria, September 13, 1828, and educated at Paris, Geneva, and at Marlborough college. He was called to the bar of the Inner Temple in 1852, joined the Oxford circuit, and also practiced as a conveyancer. He was appointed attorney-general of Hong-Kong in May, 1865, and acted as chief justice of the supreme court in 1869, and in 1874 was knighted by patent. He was appointed chief justice of the Leeward islands in 1873, and assistant under-secretary of state for the colonies in 1874. In 1876 he was appointed assistant (legal) under-secretary of state for foreign affairs. He was created a C.B. and a K.C.M.G. in 1880, and in 1882 he succeeded the late Lord Tenterden as permanent under-secretary of state for foreign affairs. In 1885 he received the grand cross of the Order of St. Michael and St. George. In 1888 he was appointed British ambassador at Washington. In the Bering Sea, the Venezuelan, and other difficulties between Great Britain and the United States, Pouncefote's tact in dealing with international affairs was powerful, and his friendliness to the United States was shown in his efforts to have the Clayton-Bulwer treaty abrogated. He was a British delegate to the peace conference at The Hague in 1899, and for his services there was raised to the peerage as Baron Pouncefote of Preston. He died in 1902.

PAUPERISM. See Poor and Poor's Laws.

PAUSA'NIAS, a Lacedæmonian general, nephew of Leonidas. He commanded the allied Greeks against the Persians at the battle of Plataea in 479 B.C. To himself alone he ascribed the victory, and his pretensions became insupportable when he afterward, with a combined Greek fleet, delivered Greece, Cyprus, and finally Byzantium from the Persian rule. At length he entered into secret negotiations with Xerxes, and conceived the design of making himself master of Greece. To escape arrest he sought shelter in the temple of Athene at Sparta, where he was shut in by the enraged people and starved to death (B.C. 467).

PA'VIA (pá-vé'á), a city of Italy, in Lombardy, 22½ miles from Milan, capital of a province of the same name. Pop. 35,447.—The province, which extends on both sides of the Po, has an area of 1285 sq. miles, partly covered by the Apennines. Pop. 496,832.

PAVILION, in architecture, a turret or small building, usually isolated, having a tent-formed roof, whence the name. A projecting part of a building, when it is carried higher than the general structure and provided with a tent-formed roof, is also called a pavilion.

PAWL, a short piece or bar moving round a pivot at one end, so as to catch in a notch or projection of a revolving body and prevent motion in one direction, as in the capstan or windlass of a ship.

PAWTUCK'ET, a town in Providence co., Rhode Island, 39 miles s.s.w. of Boston. It occupies a pleasant site

has cotton-mills, print-works, machine-shops, etc.; manufactures of boots, shoes, carriages, and an extensive trade. Pop. 43,110.

PAX, an ecclesiastical utensil in the Roman Catholic church, formed usually of a plate of metal, chased, engraved, or inlaid with figures representing the Virgin and Child, the crucifixion, etc., which, having been kissed by the priest during the Agnus Dei of the high mass, is handed to the acolyte, who presents it to be kissed by each of the ecclesiastics officiating, saying to them Pax tecum (peace to thee). The decorations of the pax are frequently very rich.

PAX-WAX, the name given to the strong, stiff tendons running along the sides of the neck of a large quadruped to the middle of the back, as in an ox or horse. It diminishes the muscular effect needed to support the head in a horizontal position.

PAYMASTER, an officer in the United States army and navy, from whom the officers and men receive their wages, and who is intrusted with money for that purpose. In matters of general discipline the paymaster is subordinate to the commanding officer of his regiment; but in regard to the immediate duties of his office he is directly responsible to the war-office. The paymaster of a ship in the navy has a general charge of the financial department in the vessel.

PAYMASTER-GENERAL, a British government officer whose duties were formerly limited to the army, but who now acts as paymaster-general of all the services. Formerly it was a lucrative, but it is now an unpaid office. The paymaster-general is ex-officio a privy councillor.

PAYNE, Henry B., American politician and capitalist, born at Hamilton, N. Y., in 1810. In 1849 he was elected to the state senate by the democrats, and was their candidate for United States senator in 1851 and for governor in 1857. In 1872 he led the Ohio delegation at the Baltimore convention which nominated Horace Greeley for the presidency. In 1875 he was elected to congress by a fusion of democrats and liberal republicans, and was one of the representatives of the house on the electoral commission in 1877. He was elected United States senator in 1884 and served from 1885 until 1891. He died in 1896.

PAYNE, Henry Clay, American politician, was born in Ashfield, Mass., in 1843. In 1863 he removed to Milwaukee, Wis., and from 1875 to 1885 was postmaster of Milwaukee. In 1880 he became a member of the republican national committee, and in the presidential campaigns of 1896 and 1900, as vice-chairman, conducted the republican campaign in the west. In 1897 he was offered the post of ambassador to Germany by President McKinley, but declined. In January, 1902, he succeeded Charles Emory Smith as postmaster-general in President Roosevelt's cabinet.

PAYNE, John Howard, best known as the author of *Home, Sweet Home*, was born in New York in 1791. He made his debut at the Park theater, New York, February 24, 1809, as Young Norval in

Douglas. Payne adapted many plays from the French and produced a number of original ones, among them *Brutus*, or the Fall of Tarquin, *Thérèse*, *Virginia*, and the comedy of *Charles II*. The song *Home, Sweet Home*, occurs in his opera of *Clari*, or the Maid of Milan, which was produced at the Covent Garden theater in May, 1823. He was appointed American consul at Tunis, Africa, in 1842; was recalled in 1845; and re-appointed in 1851. He died there April 9, 1852, and was buried in the Cemetery of Saint George at Tunis. In 1883 his remains were brought to Washington.

PEA, a well-known leguminous plant of many varieties. It is a climbing annual plant, and has been cultivated from remote antiquity. It forms one of the most valuable of culinary vegetables; contains much farinaceous and saccharine matter, and is therefore highly nutritious. Its seed-vessel is a pod containing one row of round seeds, which are at first soft and juicy, in which state they are used for the table under the name of green peas. They afterward harden and become farinaceous. A whitish sort, which readily split when subjected to the action of mill-stones, is used in considerable quantities for soups.

PEABODY, a town in Essex co., Mass., five miles northwest of Salem. It adopted its present name in 1868 in honor of the philanthropist, George Peabody, who was born in the township. Peabody institute, which is located here, contains various memorials of its founder. Pop. 12,258.

PEABODY, George, philanthropist, was born at Danvers (now Peabody) Mass., February 18, 1795. Through his energy and skill he found himself in 1830 at the head of one of the largest mercantile concerns in the world. About 1837 he established himself in London, England, as merchant and money-



George Peabody.

broker, and in 1843 he withdrew from the concern in America. It is, however, as a philanthropist that Peabody has made his name a household word. The number of his great benefactions to public objects is too great for mention here. It must suffice to name among the more important a gift of \$125,000 for educational purposes at Danvers; \$500,000 to found and endow an institution for science in Baltimore, a sum afterward increased by a second donation of \$500,000; of various sums to Harvard university; and of \$1,750,000

for the erection of dwelling-houses for the working-classes in London, which sum was increased by his will to \$2,500,000. He received from the Queen the offer of a baronetcy, but declined it. In 1867 the United States congress awarded him a special vote of thanks for his many large gifts to public institutions in America. He died at Eaton Square, London, November 14, 1869.

PEABODY COLLEGE FOR TEACHERS, a coeducational training school in Nashville, Tenn., founded in 1875 through a benefaction of \$1,000,000 by George Peabody, planned to foster the cause of intellectual development in the south. Nashville was selected as the most favorable location, and upon the offer of the trustees the buildings and endowment of the University of Nashville were accepted as the foundation. The university confers the degrees of bachelor and master of arts, sciences, and letters. The college is supported by the state, the University of Nashville, and the Peabody board, which maintains nearly 200 scholarships, distributed by the general agent of the Peabody fund.

PEACE, Breach of. See Breach.

PEACE, Justice of. See Justice.

PEACH, a tree and its fruit, of the almond genus, of many varieties. This is a delicious fruit, the produce of warm or temperate climates. The tree is of moderate stature, but varies in this respect according to soil and climate. The varieties of the fruit, which is a large downy drupe containing a stone, are very numerous, differing in size, flavor, and time of ripening, but they are principally of two sorts, the free-stones and the cling-stones, so called according as the stone separates readily or adheres to the flesh. The peach-tree is supposed to have been introduced into Europe from Persia. In the southern parts of England it is grown out of doors, and in the United States it is extensively cultivated, great quantities being canned for export. The ripe fruit is distilled and made into peach brandy. The nectarine is a smooth variety of the peach.

PEACOCK, called also Peafowl, a large and beautiful gallinaceous bird of the



Peacock.

genus *Pavo*, properly the male of the species, the female being, for distinction's sake, called a peahen. The common peacock is a native of India and

southeastern Asia. This bird is characterized by a crest of peculiar form, and by the tail coverts of the male extending far beyond the quills, and being capable of erection into a broad and gorgeous disc. The shining, lax, and silky bards of these feathers, and the eye-like spots which decorate their extremities, are known to every one. The colors and plumage are said to be more brilliant in the wild than in the domesticated state. The wild peahen lays from twenty-five to thirty eggs, and produces only a single brood in each year. The young birds of both sexes are feathered alike for the first two years; and in the third year the tail-coverts of the male begin to be developed and to assume their lustrous appearance.

PEANUT, an annual plant, also called groundnut, earthnut, goober, etc. It grows from one to two feet high with thick, greenish, hairy, stems and branches. After the flower has fallen the peduncle bends downward and pushes into the ground where the fruit or pod develops. The pods are pale straw colored, wrinkled, slightly curved, and often contracted in the middle, and contain one or two seeds. Since 1866 it has been an important crop in the United States, and is mainly grown in Virginia, North Carolina, Georgia, and Tennessee.

Peanuts are used as a forage crop and as hay. The ripe nuts and the cake which remains after the oil is pressed are also fed. Peanut kernels resemble other leguminous seeds in being rich in protein. The fat content is also high. If immature pods are left on the vines, no other food is necessary during the winter. Peanut cake mixed with less concentrated feeds has been found to be a useful cattle food. A material called "peanut meal" is made by grinding peanut hulls, immature peanuts, and those of an inferior grade. Of the 4,000,000 bushels of peanuts raised yearly in the United States, 3,000,000 bushels are used as roasted peanuts. Many nuts are used in the manufacture of confectionery and peanut butter. The latter is prepared by grinding the nut and generally mixing it with a little water. Peanut oil is made in large quantities in Europe from African-raised nuts. The shelled nuts contain 30 to 50 per cent of oil, which, if carefully made, is of good flavor, and is used for various culinary purposes and in the arts.

PEAR, a tree growing wild in many parts of Europe and Asia, and from which the numerous cultivated varieties have originated. The fruit is characterized by a saccharine aromatic juice, a soft and pearly liquid pulp, melting in the mouth, as in the butter-pear; or by a firm and crisp consistence, as in the winter bergamots. The pear is chiefly propagated by grafting or budding on the wild pear stock, or on stocks raised from the seeds of cultivated pears, called free stocks. It is also grafted on the quince, medlar, and the white thorn. At the present day more than 200 varieties are enumerated, and constant accessions are made every year. France and the north of Italy are celebrated for the perfection to which they have carried the culture of this fruit. Numer-

ous varieties are cultivated solely for the purpose of making perry, a liquor analogous to cider, and prepared nearly in the same manner. The wood is fine-grained, of a yellowish color, and susceptible of a brilliant polish. In the early ages of Greece it was employed in statuary; now it is used for musical instruments, the handles of carpenter's tools, in wood-engraving, etc.

PEARL, the name applied to a concretion produced within the shells of certain species of bivalve molluscs as the result of some abnormal secretory process. These concretions are highly valued, and are classed among the gems. The production of a pearl is generally begun by the introduction of some foreign body, such as a grain of sand, within the mantle-lobes. The presence of this body has the effect of setting up an irritant action, resulting in the deposition by the mantle of a quantity of nacreous material over the offending particle. This material, in certain species of molluscs, is of such a texture and character, and is so deposited in regular laminae or layers, that in due time the structure known as a "pearl" varying in worth and brilliancy, is formed. Chief among such molluscs are the pearl-oyster, the pearl-mussel, and the fresh-water mussels.

The chief pearl-oyster fisheries are those of Ceylon, which, together with the fisheries in the Persian Gulf, were known to the ancients. The chief seat of the Ceylon fishery is in the Gulf of Manaar, on the northeast of the island. The best pearls are found about Ceylon, Persia, and other eastern coasts, and inferior ones on the tropical coasts of America. The pearl-oyster occurs throughout the Pacific. Very fine pearls are obtained from the Sulu Archipelago on the northeast of Borneo. Of late years pearl-fishing has been started with considerable success in Australian seas; and it is carried on also in the Gulf of Mexico, upon the coast of California, and in the vicinity of Panamá.

Pearls have formed valued articles of decoration and ornament from the earliest times. Julius Cæsar presented Servilia, the mother of Marcus Brutus, with a pearl valued in modern computation at \$240,000; while Cleopatra was said to have swallowed one gem valued at \$300,000. A pearl purchased by the traveler Tavernier is alleged to have been sold by him to the Shah of Persia for \$900,000. The "Pilgrim" pearl of Moscow is diaphanous in character, and weighs 24 carats.

Artificial pearls are largely made in France, Germany, and Italy. They are very well imitated by the scales of certain fishes. A substitute for black pearls is found in close-grained hematite, not too highly polished, and pink pearls are imitated by turning small spheres out of the rosy part of the conch-shell.

PEARL, Mother of. See Mother-of-Pearl.

PEARL-ASH, the common name for carbonate of potassium. See Potash.

PEARL STONE, a felspathic mineral, consisting of silicate of aluminium with varying quantities of iron, lime, and alkalis; it occurs in spherules, which have a pearly luster.

PEARLY NAUTILUS, a name for the common nautilus. See Nautilus.

PEAT, a kind of turfy substance consisting of vegetable matter which has accumulated by constant growth and decay in hollows or moist situations on land not in a state of cultivation, always more or less saturated with water, and consisting of the remains, more or less decomposed, of mosses and other marsh plants. Peat is generally of a black or dark-brown color, or when recently formed, of a yellowish-brown; it is soft and of a viscid consistence, but it becomes hard and darker by exposure to the air. When thoroughly dried it burns, giving out a gentle heat without much smoke, accordingly it is used as fuel in those countries where it abounds, as in Scotland and Ireland. It often covers large areas, forming what is called peat-bogs, and in these the accumulation of solid peat may reach a great depth, sometimes 50 feet or more. When prepared for fuel in the ordinary way it is dug from the bog in rectangular brick-like masses, which are set up to dry on the spot, and when sufficiently dried are carried away and stacked. Peat, as it is cut from the bog, contains from 80 to 90 per cent of water, and when air-dried it retains a proportion of water equal to from 15 to 25 per cent of the whole weight. To increase its value as fuel several methods have been adopted; but in any successful process for treating peat it must be condensed by artificial means, and the water must be expelled and dried out. See Fuel.

PEARY, Robert Edwin, American Arctic explorer, was born at Cresson, Pa., in 1856. In 1887-8 he was engineer-in-chief of the Nicaragua ship canal. In 1891 he started on his first Arctic expedition and made a brilliant record of achievements, not the least of which were the results of his studies and minute experimentation in the field covering every phase of the equipment for Arctic work. He proved that the northern extension of the great interior ice-caps end below latitude 82° n. He also established the insularity of Greenland and ascertained the existence of detached ice-free land masses north of the mainland and the fact that the east and west coasts rapidly converge north of the seventy-eighth parallel. In 1893-95 he made another voyage to the same region. In the spring of 1902 he started over the frozen Arctic ocean from Cape Hecla, on the north coast of Grant Land, in his attempt to reach the North Pole. At his farthest camp in latitude 84° 17' n. the polar pack became impracticable and further efforts to advance were given up. He had attained the nearest approach to the pole in the American Arctic. Commander Peary was elected president of the American Geographical Society in December, 1902.

PEARY LAND, a name given to the northern coast region of Greenland, which was first explored by Peary in 1892.

PEA-WEEVIL. See Pea-beetle.

PEBA, a species of the armadillo found in various parts of South America. Its flesh is much valued by the natives.

PEBBLE, in jewelry, a name commonly given to an agate. Scotch agate

are commonly known as Scotch pebbles. **PECAN**, Pecan-nut, a species of hickory and its fruit, growing in North America. It is a large tree, with hard, very tough wood, pinnate leaves, and catkins of small flowers.

PEC'CARY, a genus of ungulate quadrupeds, included in the even-toed section of that order, and nearly allied to



Peba, or Texan armadillo.

the swine, in which family the genus is classified. These animals are exclusively confined to America, in which continent they represent the true swine of the Old World. In general form the peccaries resemble small pigs. The best-known species are the collared peccary and the white-lipped peccary. The former occurs abundantly in South America, and also extends into North America, living generally in small flocks, which do not hesitate to attack with their tusks any



Collared peccary.

one who meddles with them. Their food consists of maize, potatoes, sugar-canes, and similar materials; and cultivated fields suffer much from their raids. This species of peccary is readily domesticated. The flesh is savory, and less fat than pigs' flesh. The peccary possesses a glandular sac or pouch, situated in the loins, which secretes a strongly-smelling fluid of foetid nature. This must be cut away immediately on killing a peccary, to avoid contaminating the flesh.

PECK, the fourth part of a bushel; a dry measure of 8 quarts for grain, pulse, etc. The standard or imperial peck contains 2 gallons or 554.548 cubic inches.

PECK, Harry Thurston, American editor and critic, born in 1856 in Stamford, Conn. His publications include *The Semitic Theory of Creation*, *Suetonius*, *Latin Pronunciation*, and he also edited *University Bulletin*, *A Dictionary of Classical Literature and Antiquities*, *Classical Studies*, *Roman Life in Latin Prose*, and *Verse*, *Trimalchio's Dinner*, and a series of Latin classics for college use. In 1890 he became editor-in-chief of *The International Encyclopædia*, continuing as such until 1901, when,

with President Gilman and Professor F. M. Colby, he edited *The New International Encyclopædia*. In 1895 he became editor of the *Bookman*.

PECOS RIVER, a river of New Mexico and Texas, which has a southeasterly course of about 600 miles, and falls into the Rio Grande del Norte, but in summer is generally dry.

PECQUET (pek-ā), Jean, born at Dieppe about 1620, died 1674; studied medicine, and especially anatomy, at Montpellier. He discovered and demonstrated the course of the lacteal vessels in the human body.

PED'ALS, parts of the mechanism of a musical instrument acted on by the feet. Pedals are used for different purposes in different instruments. In the organ they are used in two distinct ways: first, to act on the swell and stops when the instrument is played with the hands; second, to act upon a distinct set of pipes, called the pedal organ, and which are played independently. On the pianoforte there was at first only one pedal, used to raise the dampers and prolong the sound after the fingers were lifted from the keys; a second was used to soften the notes, and is called the soft or una-corda pedal; a third has of late years been introduced, which arrests the sound immediately after the note is struck, and produces an artificial staccato. In the harmonium the pedals supply the instrument with wind.

PED'ESTAL, an insulated basement or support for a column, a statue, or a vase. It usually consists of a base, a dado, and a cornice. When a range of columns is supported on a continuous pedestal the latter is called a stylobate.

PED'IGREE. See Genealogy.

PED'IMENT, in classic architecture, the triangular mass resembling a gable, above the entablature at the end of buildings or over porticos. The pediment is surrounded by a cornice, and is often ornamented with sculpture. The triangular finishings over doors and windows are also called pediments. In the debased Roman style the same name is given to the same parts, though not triangular in their form. In the architecture of the middle ages small gables and triangular decorations over openings, niches, etc., are called pediments.

PEDOM'ETER, is an instrument like a watch, which serves to indicate the distance a pedestrian traveler has gone, or rather the number of paces he has made.

PEDRO II., ex-Emperor of Brazil, was born at Rio Janeiro 1825; succeeded to the throne on the abdication of his father, Dom Pedro I., in 1831; and married the Princess Theresa Christina Maria (died 1890), sister of Francis I., king of Naples, in 1843. Brazil prospered greatly under the rule of Pedro II., who did much to develop its resources in every direction. In 1871 he issued an imperial decree for the gradual abolition of slavery, which totally ceased in Brazil in May, 1888. He was deposed by the revolution of November, 1889, and died at Paris in 1891.

PEDUN'CLE, in botany, the stem or stalk that supports the fructification of a plant, i. e., the flower and the fruit.

PEEKSKILL, an industrial town of the United States, state of New York, on Hudson river, 43 miles north of New York City. Pop. 11,917.

PEEL, Arthur Wellesley, Viscount, youngest son of Sir Robert Peel, born 1829. He was educated at Eton and Oxford; was member for Warwick (1865-1895); parl. sec. to Poor-law board (1868-71); sec. to Board of Trade (1871-73); patronage sec. to treasury (1873-74); under sec. for Home department (1880); succeeded Sir Henry Brand in 1884 as speaker of the House of Commons, retiring in 1895; was chairman of the Licensing commission of 1896-1900 and drafted the minority report.

PEEL, Sir Robert, British statesman, was born 5th February, 1788, near Bury in Lancashire. Immediately on attaining his majority he was elected member of parliament for Cashel; in 1810 he became under-secretary of state for the colonies, and in 1812-18 he was chief secretary for Ireland. In 1822, under the Liverpool ministry, he



Sir Robert Peel.

became home secretary, and continued in this office till the dissolution. Refusing to take office under Canning, he joined the ministry of the Duke of Wellington in 1828 as home secretary. The principal act of this ministry was the passing of the Roman Catholic relief bill, which cost Peel his seat for Oxford. Peel also passed the New Metropolitan Police Act, which gave rise to the new nicknames Bobbies and Peelers for the London police. In 1830 he succeeded his father as baronet. In the election of 1832 he was returned for Tamworth, for which he continued to sit during the remainder of his life. On the dismissal of the Whig government in 1834 Peel undertook the government but his party in the house being in a minority the task was hopeless. After a brief struggle the ministry resigned, and were succeeded by the Whig ministry of Lord Melbourne, which lasted from 1835 to 1841. The general election of 1841 gave a large majority to Sir Robert Peel, and the formation of a conservative ministry could no longer be delayed. In the session of 1842 the most important measures were the sliding-scale, by which a considerable reduction was made on the duties on the importation of corn; the imposition of an income-tax for three years, but

which, with various alterations, has continued to be levied to the present time; and a revision of the tariff. In 1844 and 1845 he passed his celebrated English and Scotch Banking Acts. During the recess in 1845 the potato-rot and famine in Ireland brought the question of the corn-laws to a crisis, and Peel declared in favor of their total repeal. The act repealing corn-laws (after a modified duty for three years) was passed 26th June, 1846. On the same day the ministry was defeated in the House of Commons on the Irish Coercion bill, and on the 29th of June Sir Robert Peel resigned. As leader of the opposition he supported many of the measures of the government of Lord John Russell, who succeeded him; but the policy of Lord Palmerston after the revolution crisis of 1848-49 evoked from him a more active hostility to the ministry. On 29th June, 1850, he was thrown from his horse, and received injuries of which he died on 2d July. By his will he renounced a peerage for his family, as he had before declined the Garter for himself.

PEER, in general, signifies an equal, one of the same rank and station. In this sense it is used by the common law of England, which declares that every person is to be tried by his peers. Peer also signifies in Britain a member of one of the five degrees of nobility that constitute the peerage (duke, marquis, earl, viscount, baron), or more strictly a member of the House of Lords. The dignity and privileges of peers originated with the growth of the feudal system, the peers being originally the chief vassals holding fiefs directly from the crown, and having, in virtue of their position, the hereditary right of acting as royal counselors. Subsequently not all the crown vassals appeared at court as advisers of the king, but only those who were summoned to appear by writ. This custom grew at length into a rule, and these summonses were considered proofs of hereditary peerage. Latterly the honor of the peerage has been exclusively conferred by patent. As regards their privileges all peers are on a perfect equality. The chief privileges are those of a seat in the House of Lords, of a trial by persons of noble birth in case of indictments for treason and felony, and misprison thereof, and of exemption from arrest in civil cases. The British peerage collectively consist of peers of England, of Scotland, of Great Britain, of Ireland, and of the United Kingdom, but only a portion of the Scotch and Irish peers are peers of parliament. The lords spiritual, though sitting in the House of Lords, are not considered peers.

PEF'FER, William Alfred, an American lawyer, born in 1831 in Cumberland co., Pa. In 1865 he removed to Kansas, established the Fredonia Journal and the Coffeyville Journal. In 1874 he was elected to the state senate, in 1880 was a republican presidential elector, and in 1881 assumed the editorship of the Kansas Farmer. From 1891 to 1897 he represented the people's party in the United States senate, and in 1898 was nominated by the prohibitionists for governor of Kansas. Among his publications are:

Peffer's Tariff Manual, The Way Out, The Farmer's Side, Americanism in the Philippines, Rise and Fall of Populism in the United States.

PEG'ASUS, in Greek mythology, a winged horse, the offspring of Poseidon and Medusa. Bellerophon made use of Pegasus in his fight with the Chimæra. With the stroke of his hoof Bellerophon called forth the sacred well Hippocrene, on Mount Helicon, from which he was in later times called the horse of the muses.

PEGU (pe'gō), now a division of Lower Burmah, but previous to 1757 a powerful and independent kingdom, and from that period up to 1853 a province of the Burmese empire, from which it was severed and annexed to the British dominions in 1853. The province comprised the whole delta of the Irrawady; area, 25,964 sq. miles; pop. 2,323,512. The modern division of Pegu lies mainly on the east of the lower Irrawady; area, 9159 sq. miles; cultivated area, 2043 sq. miles; pop. 1,818,845. Chief town, Rangoon.

PEI-HO (pe-i-hō'), a river of Northern China, rises near the Great Wall, and flows southeast to the Gulf of Pechele. It is navigable for boats to within 20 miles of Peking, which it passes at the distance of about 10 miles.

PEIRCE, Benjamin, born in Salem, Mass., April 4, 1809; died October 6, 1880. He graduated in 1829 at Harvard, where he became professor of mathematics and natural philosophy, and afterward of astronomy, holding the latter chair until his death. Professor Pierce was for many years connected with the United States coast survey and made several valuable observations of eclipses and other celestial phenomena. He achieved great note as a mathematician, was a member of the American Academy of Arts and Sciences, of the Royal Astronomical society, and of many other learned bodies. His writings on mathematics are text-books in all American colleges. He died in 1880.

PEKING', or **PEKIN'**, the capital of the Chinese empire, in the province of Chih-le or Pechele, on an extensive, barren, sandy plain, between the rivers Pei-ho and Hoen-ho, about 40 miles from the Great Wall, and 100 miles from the Gulf of Pechele. The entire circuit of the walls and suburbs of Peking is reckoned at 30 miles. There are in all sixteen gates leading into the city, each protected by a semicircular enciente, and a higher tower built in galleries. The city consists of two portions, the north or Tartar city, and the south or Chinese city. The former is built in the shape of a parallelogram, and consists of three inclosures, one within the other, each surrounded by its own wall. The innermost inclosure ("the forbidden city") contains the imperial palace, and buildings connected with it, in which the emperor and royal family reside. The second inclosure ("the imperial city") is the residence of the imperial princes and officials of the highest rank. The outer or Tartar city proper is the seat of the six supreme tribunals, and contains the legations of Great Britain, France, the United States, and Russia. In the Chinese city broad straight streets

run from gate to gate, intersecting each other at right angles, but they are unpaved, and in rainy weather impassable from mud. Among the principal public buildings of Peking are the Temple of Eternal Peace, belonging to the lamas; the Mohammedan mosque; the observatory; the temple of agriculture and the temple of heaven. In the latter temple the emperor periodically offers sacrifice. It occupies a commanding position, and is approached from the different sides by magnificent alabaster stairs. There are religious edifices appropriated to many forms of religion, the principle of toleration being here



Temple of Heaven, Peking.

carried to the utmost extremity. Among the institutions of Peking are the national college, the medical college, astronomical board, and the imperial observatory. Peking is regarded by the Chinese as one of their most ancient cities, but it was not made the capital of the country until its conquest by the Mongols about 1282. In the war of 1860 Peking was occupied by the British and French. In 1900 the foreign colony was besieged, and was relieved by an international force after severe fighting. Pop. variously estimated at from 500,000 to 1,650,000.

PELEE (pā-lā'), Mont, an active volcano of the island of Martinique, situated in its northwestern part, in about latitude 14° 48' n. The elevation of the culminating point previous to May, 1902, was about 4300 feet; of the newly formed cone, with its extended "plug" or obelisk, in May, 1903, 5200 feet. The historically recorded eruptions of Mont Pelée are those of 1762, August, 1851, and 1902-03. The great eruptions of 1902 were from the basin of the Etang Sec, or "Dry Lake." The active opening of this crater was on April 25, 1902; on May 5th, descended the "avalanche" of boiling black mud that destroyed the sugar estate of Guérin, and buried beneath its mass thirty or more, and on May 8th the black cloud of explosive and exploded superheated steam, destroyed Saint Pierre, and about 30,000 people. The second death-dealing eruption of Mont Pelée took place on August 30th at about 9 p.m. The loss of life in this later explosion has been estimated at from 2000 to 2500.

PELEUS (pē'lūs), in Greek mythology,

son of Æacus, king of Ægina. After many adventures he became master of a part of Thessaly, and married the nymph Thetis, by whom he became the father of Achilles. The nuptials were celebrated on Mount Pelion, and honored with the presence of all the gods, who brought rich bridal presents. After his death he received divine honors.

PELEW' ISLANDS, a group belonging to the Caroline Archipelago, in the North Pacific ocean. They are about twenty in number, extend nearly n.e. and s.s.w. 87 miles, and are completely encircled by reefs. They are fertile, and enjoy a good climate. The inhabitants are Polynesians, and have generally got a high character from visitors. Pop. 6000.

PE'LIAS, a genus of serpents, including the common viper or adder.

PEL'ICAN the name of several web-footed birds. They are larger than the swan, have a great extent of wing, and are excellent swimmers. Pelicans are gregarious, and frequent the neighborhood of rivers, lakes, and the sea-coast, feeding chiefly on fish, which they capture with great adroitness. They have a large flattened bill, the upper mandible terminated by a strong hook, which curves over the tip of the lower one; beneath the lower mandible, which is composed of two flexible, bony branches meeting at the tip, a great pouch of naked skin is appended, capable of holding a considerable number of fish, and thus enabling the bird to dispose of the superfluous quantity which may be taken during fishing expeditions, either for its own consumption or for the nourishment of its young. The species are found in Europe, Asia, Africa, and America. They sometimes perch upon trees; the nest is of rough construction, usually placed close to the water. The common or white pelican is colored a delicate white, tinged with rose or pink. The young birds are fed by the parents with fishes from the pouch, and the males are said to feed the incubating females in a similar manner. The common pelican inhabits Europe, Asia, and



Pelican.

Africa. About the middle of September flocks repair to Egypt. During the summer months they take up their abode on the borders of the Black Sea and the shores of Greece. They are rare in France and unknown in Britain. The pelican is not only susceptible of domestication, but may even be trained to fish for its master.

PELISSIER (pā-lēs-yā), Jean Jacques Amable. Duc de Malakoff, Marshal of

France, was born in 1794, died in Algeria 1864. In 1855 he replaced Canrobert as commander-in-chief of the French army in the Crimea; and by the vigor with which he pushed the siege he justified the expectations which had been formed of him. On the capture of the Malakoff and the fall of Sebastopol Pélissier received his marshal's baton, and an annual pension of 100,000 francs. He was afterward vice-president of the senate, a privy-councillor, and ambassador to England (1858). In 1860 he was appointed governor-general of Algeria.

PELOPONNE'SUS, the peninsula which comprehends the most southern part of Greece, now called the Morea. Peloponnesus was anciently divided into six states: Messenia, Laconia (Sparta), Elis, Arcadia, Achaia, and Argolis, to which some add Sicyon. See Greece and articles on the different states.

PE'LOPS, in Greek mythology, son of Tantalus, king of Lydia. He married Hippodamia, a daughter of King Ænomaus of Elis, and succeeded his father-in-law in that kingdom. Peloponnesus received its name from him. Of his sons, Atreus and Thyestes are most celebrated. Many and very different myths are connected with his name.

PELVIS (Latin, pelvis, a basin), the bony basin formed by the "haunch-bones" and sacrum of Vertebrata, which



Pelvis.

a, Ilium; *b*, ischium; *c*, pubis; *d*, symphysis pubis; *e*, sacrum; *f*, coccyx; *g*, acetabulum or cavity for head of thigh-bone.

constitutes the girdle or arch giving support to the lower or hinder limbs. The pelvis thus corresponds to the shoulder-girdle of the upper or fore limbs; and forms a cavity or basin in which several of the abdominal viscera, and organs relating to reproduction and the urinary functions, are protected and contained. The pelvis of man differs materially from that of woman, the differences having chiefly reference to the greater capacity required for the womb during pregnancy and for the expulsion of the child at birth. It also varies somewhat in the different races of men.

PEM'BROKE, a parliamentary and municipal borough and seaport of South Wales, a capital of the county of the same name, on a creek on the southern side of Milford Haven, 206 miles west of London. The county is bounded by Cardiganshire, Carmarthenshire, the Bristol Channel, and St. George's channel; area, 391,181 acres, of which about 300,000 acres are under cultivation. Pop. 88,749.

PEM'ICAN, originally a North American Indian preparation consisting of the lean portions of venison dried by the sun or wind, and then pounded into a paste and tightly pressed into cakes.

Pemican made of beef has sometimes been used by travelers.

PEN, an instrument for writing with a fluid. Pens of some sort have been in use from very early times, adapted to the material on which the characters were to be inscribed. The metallic stilus for the production of incised letters was probably the earliest writing implement. It was used by the Romans for writing on tablets coated with wax; but both they and the Greeks also used what is the true ancient representative of the modern pen, namely, a hollow reed, as is yet common in eastern countries. It has been asserted that quills were used for writing as early as the 5th century A.D. In Europe they were long the only writing implement, the sorts generally used being those of the goose and swan. Up till the end of the first quarter of the present century these formed the principal materials from which pens were made. In 1803 Mr. Wise produced steel pens of a barrel form, mounted in a bone case for carrying in the pocket. Joseph Gillott commenced the manufacture about 1820, and succeeded in making the pen of thinner and more elastic steel, giving it a higher temper and finish. Improvements have so reduced the cost and raised the quality, that a gross of better pens are now sold by the same makers at one-sixth of the price of a single pen in 1821. Gold pens tipped with minute particles of iridium are now in somewhat extensive use, and a good one will last for years. Fountain pens and penholders, to carry a considerable supply of ink and to discharge it in an equal manner, were invented by Joseph Bramah. The most successful form of fountain pen yet introduced is the stylograph patented in the United States by Cross 1878, and by Mackinnon 1879.

PENAL LAW. See Criminal Law.

PENANCE, in theology, a punishment accepted or self-imposed by way of satisfaction and in token of sorrow for sin. In the early Christian church penances were of three kinds—secret, public, and solemn. The first consisted of such actions as are commonly imposed by confessors at the present day, as the repetition of certain prayers, etc. Public penance was in use from the earliest days of the church. It was often very severe, and the penitents had to make a public confession of their sins in the church. It became gradually the custom of the bishops to commute the canonical penances for pious works, such as pilgrimages, alms-deeds, and other works of charity—and these again were exchanged for indulgences. In the Roman Catholic church penance is one of the seven sacraments. The matter of it consists of the three acts of the penitent: 1, Contrition, or heartfelt sorrow for sin as being an offense against God; 2, Confession to an authorized priest; and 3, Satisfaction, or the acceptance and performance of certain penitential works in atonement of the sin; and the form of the sacrament is the sentence of absolution from sin pronounced by the priest who received the confession, and has been satisfied of the earnest repentance of the sinner. According to the doctrine of the Protestants there is no such sacrament; they consider repentance and

faith as the only requisites for forgiveness.

PENANG', Pulo-Penang, or Prince of Wales Island, an island belonging to Great Britain, lying at the north entrance of the Straits of Malacca, off the west coast of the Malay Peninsula, from which it is separated by a channel 2 to 5 miles across; area, 107 sq. miles. The island produces cocoa-nuts and arecanuts, nutmegs and cloves, rice, sugar, coffee, and pepper. Georgetown, or Penang (pop. 84,948), the capital and port of the settlement, is a handsome town, rapidly increasing in size, and has a large commerce. Pop. of Penang, 128,830.

PENCIL, an instrument used for painting, drawing, and writing. The first pencils used by artists were probably pieces of colored earth or chalk cut into a form convenient for holding in the hand. On the introduction of moist colors, however, delicate brushes of fine hairs were used. Pencils of this kind, and of various degrees of fineness are now almost solely used by painters for laying on their colors; but in China and Japan they are generally employed, instead of pens, for writing. The hairs used for these pencils are obtained from the camel, badger, squirrel, sable, goat, etc. Black-lead pencils, for writing or drawing, are made of graphite or plumbago (otherwise known as black-lead), generally cased in cedar wood. The comparative hardness and blackness of pencils are attained by the degree of heat to which they are subjected and the proportions of graphite and clay in the leads. Nuremberg is the great center of the lead-pencil trade. Colored pencils are prepared from various chalks, such as are used for crayons, instead of the graphite. Pencils for writing on slate are made by cutting slate into small square pieces and rounding them, or into narrow slips and incasing them in wood.

PENDENTIVE, in architecture, the portion of a dome-shaped vault which descends into a corner of a quadrangular opening when a ceiling of this kind is placed over a straight-sided area; in



Pendentive roof, Salisbury cathedral a a a, pendentives.

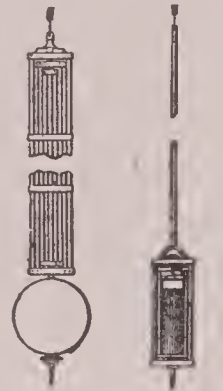
Gothic architecture, the portion of a groined ceiling springing from one pillar or impost, and bounded by the ridges or apices of the longitudinal and transverse vaults.

PENDLETON, Edmund, American statesman, was born in Carolina co., Va., in 1721. He was a delegate to the First Continental congress and was president of the Virginia conventions

of 1775 and 1776. The resolution of May, 1776, instructing the state delegates to introduce a declaration of independence in congress was written by him. In 1788 he presided over the Virginia convention which ratified the federal constitution, he himself taking an active part in the debate and being largely responsible for the final decision. He died in 1803.

PENDLETON, George Hunt, born in Cincinnati, Ohio, July 15, 1825. He practiced law in Cincinnati, served in the state senate, and from 1856 until 1865 sat in congress as a democrat. In 1864 he was nominated for vice-president of the United States on the democratic ticket, headed by George B. McClellan. From 1879 until March, 1885, he was United States senator from Ohio, and in the latter year was appointed by President Cleveland, minister to Germany. He died in 1889.

PENDULUM, in the widest sense, a heavy body suspended so that it is free to turn or swing upon an axis which does not pass through its center of gravity. Its only position of stable equilibrium is that in which its center of gravity is in



Gridiron pendulum. Mercurial pendulum.

the same vertical plane with the axis. If the body is displaced from this position it will tend to return to it, and it will oscillate or swing from one side of that position to the other until its energy is destroyed by friction, and it at length comes to rest. A small, heavy body suspended from a fixed point by a string, and caused to vibrate without much friction, is called a "simple pendulum." A true simple pendulum is a mathematical abstraction: a heavy particle, an inextensible and inflexible weightless string, and no friction; these conditions are only approximated to in nature. The ordinary pendulum is what is properly a "compound pendulum." A compound pendulum, as seen in clocks, is usually a rigid, heavy, pendulous body, varying in size according to the size of the clock, but the "seconds" pendulum may be considered the standard. The pendulum is connected with the clockwork by means of the escapement, and is what renders the going of the clock uniform. In a clock it is necessary that the period of vibration of the pendulum should be constant. As all substances expand and contract with heat and cold, the distance from the center of suspension to the center of gravity of a pendulum is continually altering. Pendulums constructed so

that increase or diminution of temperature do not affect this ratio are called compensation pendulums. These take particular names, according to their forms and materials, as the gridiron pendulum, the mercurial pendulum, etc. The former is composed of a number of rods so connected that the expansion or contraction of certain of them is counteracted by that of the others. The mercurial pendulum consists of one rod with a vessel containing mercury at the lower end, so adjusted in quantity that whatever alterations take place in the length of the pendulum, the center of oscillation remains the same, the mercury ascending when the rod descends, and vice versa.

PENEL' OPE, in Greek mythology, the wife of Odysseus (Ulysses) and mother of Telemachus, who was but an infant when his father sailed against Troy. During the protracted absence of Odysseus, Penelopē was surrounded by a host of suitors, whom she put off on the pretext that before she could make up her mind she must first finish a large robe which she was weaving for her father-in-law Laërtes. To gain time she undid by night the work she had done by day. Her stratagem was at last communicated to the suitors by her servants, and her position became more difficult than before; but fortunately Odysseus returned in time to protect his spouse, and slay the obnoxious wooers who had been living in riot and wasting his property.

PENGUIN, a family of natatorial or swimming birds adapted for living almost entirely in the water. They possess only rudimentary wings, destitute of quill-feathers, and covered with a scaly integument or skin. Although useless as organs of flight the wings are very effective aids in diving, and on land they may be used after the fashion of fore-limbs. The legs are placed at the hinder extremity of the body, and the birds assume an erect attitude when on land. The toes are completely webbed. They inhabit chiefly the high southern latitudes, congregating sometimes in



Emperor penguin.

colonies of from 30,000 to 40,000. There are three different types of penguins, represented by the king penguin, the jackass penguin, and the rockhopper. The jackass penguin and the rockhopper are about 2 feet 3 inches in height, and

PENINSULA

the king penguin somewhat larger; but a fossil penguin of the upper Eocene stood from 6 to 7 feet high.

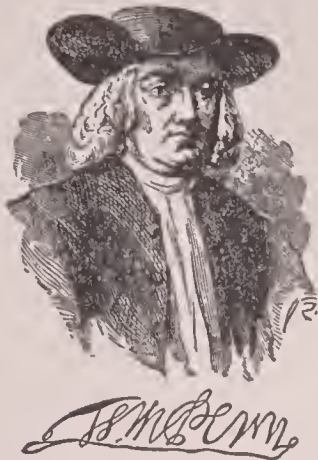
PENIN'SULA, a portion of land almost surrounded by water, and connected with the mainland by a narrow neck or isthmus.

PENINSULAR WAR, The, was caused by the intrigues and ambition of Napoleon, who proposed the partition of Portugal (1807), and placed his brother Joseph upon the throne of Spain. For a time the whole peninsula was occupied by French troops, but the Spanish and Portuguese peoples rose in defense of their liberties, and waged a fierce guerilla warfare against the invaders. Britain joined the patriots in 1808. Of the memorable struggle which ensued the main features were the retreat of Sir John Moore to Coruña, and his glorious death there; the accession of Sir Arthur Wellesley (afterward Duke of Wellington) to the supreme command, his formation of the celebrated lines of Torres Vedras, where he held the French armies in check until he had accomplished the complete liberation of Portugal; and his subsequent victorious march through Spain, marked by the great battles of Salamanca (1812) and Vittoria (1813). In the spring of 1814 the tide of war rolled through the passes of the Pyrenees into the south of France, where this great struggle was concluded by the crowning victory of Toulouse.

PENITENTIARY, a prison in which convicted offenders are confined and subjected to a course of discipline and instruction with a view to their reformation. Penitentiaries, in this latter sense, were instituted by act 19 George III. cap. vii. See Prison.

PENN, William, the founder of the state of Pennsylvania, was born in London in 1644. From his father he had inherited a claim upon the government of \$80,000, and in settlement of this claim the government in 1681 granted him large territories in North America, the present state of Pennsylvania, with right to found a colony or society with such laws and institutions as expressed his views and principles. The following year Penn came over to America and laid the foundations of his colony on a democratical basis, and with a greater degree of religious liberty than had at that time been allowed in the world. A great number of settlers, not only Quakers, but members of all denominations, Englishmen, Germans, Swedes, gathered together; the city of Philadelphia was laid out upon the banks of the Delaware, and the colony soon came into a most flourishing condition. He remained in the province about two years, adjusting its concerns, and establishing a friendly intercourse with his colonial neighbors. Soon after Penn returned to England King Charles died (1685); and the respect which James II. bore to the late admiral, who had recommended his son to his favor, procured to him free access at court. He made use of this advantage to solicit the discharge of his persecuted brethren, 1500 of whom remained in prison at the decease of the late king; and his influence is thought to have hastened, if it did not occasion, the proclamation for a general pardon,

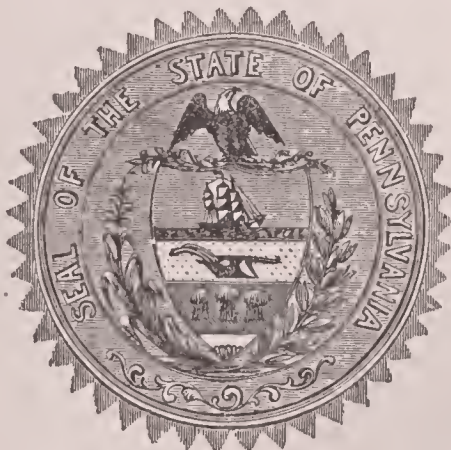
and the repeal of religious tests and penalties. At the revolution in 1688 Penn's intimacy with the abdicated monarch created suspicions, in consequence of which he was accused of



treason, and withdrew from public notice till 1693. In 1699 he again sailed for Pennsylvania, intending to make it the place of his future residence; but he returned to England again in 1701. He died at Ruscombe, Berks, 30th July, 1718.

PENNON, a small triangular flag carried by the knights of the middle ages near the points of their lances, bearing their personal devices or badges, and sometimes richly fringed with gold.

PENNSYLVANIA, one of the United States of North America, bounded by New York, Lake Erie, Ohio, W. Virginia, Maryland, Delaware, and New Jersey; area, 45,215 sq. miles. Except on the east, where the river Delaware forms an irregular boundary line, its sides form an almost exact parallelogram facing the cardinal points. The surface is traversed southwest to northeast by the Alleghany chain, and covered by many smaller ranges, which are more or less parallel to it. On the east side the Alleghanies are rugged and steep, but on the west descend very gradually, and then stretch out into an extensive



Seal of Pennsylvania.

table-land. The principal rivers are the Delaware, which receives the Lehigh and the Schuylkill; the Susquehanna; and the Alleghany, which unites at Pittsburgh with the Monongahela to form the Ohio. Pennsylvania is one of the healthiest states of the Union. The soil

PENNSYLVANIA

has various grades of fertility, but is in general well adapted for agricultural operations. The richest and most highly cultivated tract is southeast of the mountains on both banks of the Susquehanna.

Pennsylvania's agriculture is highly varied and quite large. The state leads the country in the production of rye and is second in buckwheat, having one-third of the total acreage of the country in that staple. Potatoes, sweet corn, and cabbage form a large part of its products. Its fruit industry is also large. Sixty-six per cent of its fruit trees are apple trees. The state ranks fourth in dairy products, and its poultry production is very large.

In manufactures Pennsylvania ranks second. It furnishes 54 per cent of all the iron manufactures of the country. It ranks first in foundry and machine-shop products, furnishing more than one-half the locomotives of the country. A different group of industries, less dependent upon the material resources of the state, is the manufacture of textiles, in which the state takes second rank. Philadelphia, the principal seat



of the industry, is the largest textile center in the country. Pennsylvania ranks second in the manufacture of woolen goods and hosiery. In 1900 Pennsylvania manufactured 48 per cent of the total carpet product of the United States. More ingrain carpets are probably made in Philadelphia than in any other city in the world.

Coal, iron, and salt are found in almost exhaustless abundance. In the mountain districts of the south and east to the west of the Susquehanna an anthracite coal-field occurs over an area estimated at 472 sq. miles; while to the west of the Alleghanies a vast bituminous coal-field, of which Pittsburgh may be considered the center, has been traced over an area of 12,300 sq. miles. The annual output of coal alone exceeds in value the total mineral product of any other state. Anthracite has been mined continuously since 1820. The anthracite coal fields of Pennsylvania yield almost the entire product for the United States, and represent the only high-grade anthracite producing region in the world. It was not until about 1875 that bituminous coal began to be extensively used in iron-smelting, but since then it has far exceeded anthracite in annual tonnage. There are about 100,000 employees engaged in coal mining.

Pennsylvania has always ranked first in the production of coke, usually yielding about two-thirds of the total for the United States. Pennsylvania is without a rival in the stone-quarrying industry. The production of slate is about two-thirds that for the whole country. Pennsylvania also ranks first in the amount of limestone quarried. About two-fifths of the limestone is used for flux, and a somewhat less amount is burned into lime. Pennsylvania stands second in the value of its clay products and first in the output of brick. The state produces in value over half the total product of Portland cement for the United States. Some rock cement is also produced. Other products worthy of note are metallic paint, mineral water, salt, and ochre. The strata of both coal fields contain many valuable seams of ironstone, and both the smelting and working of iron have long been regarded as the most important interest of the state. An accession of immense value was the discovery of petroleum in 1859. In railroad mileage Pennsylvania is exceeded by only one state, having upward of 10,500 miles of road, with proportional passenger and freight traffic.

Philadelphia and Erie are ports of entry. Philadelphia ranks third among the Atlantic coast ports in the value of its foreign trade. Erie has one of the best harbors on Lake Erie, and carries on a large import trade in Michigan iron and Canadian lumber, and exports large quantities of coal. Pittsburg has an immense inland trade, while its local shipyards build large numbers of steamboats for use on the western streams.

The largest religious denomination is the Methodist Episcopal. Education is free but not compulsory. Among the higher educational institutions are the University of Pennsylvania, Philadelphia, and Pennsylvania college, Gettysburg. Harrisburg, though an insignificant place compared with Philadelphia, Pittsburg, and several other towns, continues to be the capital.

Pennsylvania was settled by the Dutch when, on Aug. 28, 1609, Henry Hudson anchored in Delaware Bay in his ship the Half Moon. The grant of the extensive territory called Pennsylvania, made by Charles II. in 1681 to William Penn, carried with it full proprietorship and dominion, saving only the king's sovereignty. In 1682, when Penn crossed the sea to take possession, he found the western bank of the Delaware already occupied by nearly 6,000 Swedes, Dutch, and English, the Swedes having begun a settlement in 1638. To these, as to settlers from all nations, he conceded equal liberties. English Quakers, Scotch and Irish Presbyterians, German Mennonites, French Huguenots, men of all religions, were alike welcome; the population increased for a few years at the rate of one thousand a year; then more rapidly, so that at the end of seventy-five years it exceeded 200,000. Though stout against the Stamp Act of 1765 and other parliamentary encroachments, Pennsylvania was not swift to move; a committee of safety seized the reins till the people could speak through a representative convention. The convention espoused the revolution; in

September, 1776, a state constitution was promulgated, in 1778 the old charter was formally annulled and the Penn claims silenced by payment of \$650,000. During the war Pennsylvania was the scene of important events—the deliberations of the congress and the declaration of independence in 1776; the battles of Brandywine and Germantown in 1777; the British occupation of Philadelphia, and the encampment of Washington at Valley Forge, in 1777–78. A brief but violent mutiny of the unpaid soldiery of Pennsylvania in 1781 led congress to adopt a better system of finance, under the wise guidance of Robert Morris of Philadelphia. In 1812, at the outbreak of war with Great Britain, Pennsylvania promptly furnished its quota of troops. Internal improvements were projected early, and the Schuylkill canal was begun in 1815 and completed in 1825. From 1829 to 1836 the projected improvements called for the construction of 292 miles of canal and 126 miles of railroad, at a total cost of \$35,000,000. The first bill for a public school system was passed in the face of violent opposition in 1834. Though the iron and coal had been known to exist before the revolution, it was not until 1839 that anthracite was successfully applied to the manufacture of iron. The first oil well was sunk near Titusville in 1859. At the opening of the war with the southern states in 1861, in response to the president's call for 14,000 men as the state's quota, Pennsylvania sent 25,975, and during the war furnished a total of 387,284. No other northern state was invaded. At Gettysburg, near the state border, a three days' battle was fought, June 30 to July 3, 1863, resulting in a decisive victory of the federal forces. In 1864 Chambersburg was burned by the confederates.

A criminal combination in the anthracite mining region, known as the "Molly Maguires," was broken up in 1876 by due course of law, twenty men being hanged for murder. In 1877 the "railroad riots," an outbreak of dissatisfied railway employees, caused a vast destruction of property at Pittsburg and vicinity, but were quelled by the military. The constitution has been four times revised—in 1838, 1850, 1857, 1874.

In national elections the state was at the outset federalist, but in 1796 fourteen of its fifteen votes were cast for Jefferson. Eight votes were cast for him again in 1800, while seven went to the federalist candidate. From this time until 1840 the state was democratic. The state gave its vote to Polk in 1844, to Taylor in 1848, and in 1852 and 1856 to the democratic candidates. Since 1860 the state has been overwhelmingly republican in national affairs, though, on account of factional fights in the republican ranks, a democratic governor has been twice elected. Population 7,450,000.

PENNSYLVANIA DUTCH, a German dialect mixed with English spoken in Pennsylvania by German settlers and their descendants.

PENNSYLVANIA, Historical Society of, an association organized in Phila-

delphia in 1824. Its object is the elucidation of history with special reference to that of Philadelphia. It has a valuable historical library and a museum at Philadelphia. The society has a subscribed publication fund of \$40,000, the revenue from which is expended in printing matter of historic interest.

PENNSYLVANIA, University of, an institution of higher learning in Philadelphia, Pa., established in 1740 as a charitable school and raised to the grade of an academy in 1751. In 1755 the institution was converted into the College and Academy of Philadelphia. In 1791 an act was passed amalgamating the old college with the new university under its present title. In 1872 the university was moved to its present site.

The departments of the university are the college, including the school of arts, the Towne Scientific school and the courses for teachers, the departments of philosophy (graduate school), law, medicine, dentistry, veterinary medicine, and archæology; the Wistar institute of anatomy and biology; the laboratory of hygiene, the veterinary hospital, the library and the Flower astronomical observatory, physical education. The school of art offers courses in arts and science, finance and commerce, biology and music. The Towne scientific school offers courses in architecture, science, and technology, mechanical, electrical, civil, and chemical engineering, and chemistry.

The university confers the degrees of bachelor of arts, laws, music, and science, master of arts and science, doctor of philosophy, medicine, dental surgery, and veterinary medicine, and the technical degrees of civil, mechanical electrical, and chemical engineer.

PENNY, a British coin (formerly of copper since 1860 of bronze), the twelfth part of a shilling. It was at first a silver coin weighing about 22½ grains troy, or the two-hundred-and-fortieth part of a Saxon pound. Till the time of Edward I. it was so deeply indented by a cross mark that it could be broken into halves (thence called half-penny) or quarters (fourthings or farthings). Its weight was steadily decreased till at last, in the reign of Elizabeth, it was fixed at 7½ grains, or the sixty-second part of an ounce of silver. Copper pennies were first coined in 1797, but copper half pennies and farthings had been in use from 1672.

PENNYWEIGHT, a troy weight containing 24 grains, each grain being equal in weight to a grain of wheat from the middle of the ear, well dried. It was anciently the weight of a silver penny, hence the name.

PENOBSCOT, the largest river of Maine, United States of America. It flows 300 miles south by west to Penobscot bay. It is navigable for ships to Bangor, 60 miles, where the tide rises 17 feet.

PENSACOLA, a port of entry and capital of Escambia co., Florida, on the Pensacola bay, 64 miles east of Mobile. Pensacola suffered considerably in 1861 during the American civil war. Vessels drawing 21 feet can approach the town, and the bay is one of the safest and most capacious in the Gulf of Mexico.

PENSIONS

It is a naval station and depot, and is well defended by several strong forts. Pop. 20,110.



PENSIONS, annual allowances of money settled upon persons, usually for services previously rendered. In Great Britain, besides large sums devoted to pensioning army and navy men, pensions are conferred upon the judges of

the like, or to their widows or families, for the purpose of rewarding personal merit and of encouraging literature, art, and science. The policy of the United States government has confined the bestowment of pensions to the officers and privates who have served in the army or navy during the wars in which the republic has been engaged, or who have been wounded or otherwise disabled while in active service, and to their widows, children, and other dependent relatives.

PEN'TACLE, a figure consisting of five straight lines crossing and joined so as to form a five-pointed star. It was a symbol among the Gnostics, and was employed with superstitious import by the astrologers and mystics of the middle ages.

PEN'TAGON, a figure of five sides and five angles; if the sides and angles be equal it is a regular pentagon; otherwise, irregular.

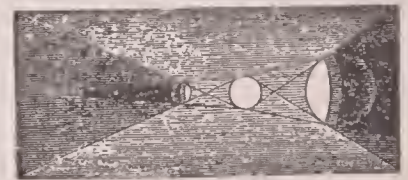
PEN'TATEUCH, the Greek name applied to the first five books in the

Greek, not Hebrew. It begins with an account of creation and the primeval condition of man; of the entrance of sin into the world, and God's dealing with it, broadening out into a history of the early world, but again narrowing into biographies of the founders of the Jewish family; it then proceeds to describe how the family grew into a nation in Egypt, tells us of its oppression and deliverance; of its forty years' wandering in the wilderness; of the giving of the law with all its civil and religious enactments; of the construction of the tabernacle; of the census of the people; of the rights and duties of the priesthood; and concludes with the last discourses of Moses and his death. The Pentateuch and the book of Joshua are sometimes spoken of together as the Hexateuch; when Judges and Ruth are added, as the Octateuch.

PEN'TECOST, a Jewish festival, held on the fiftieth day after the passover, in celebration of the ingathering and in thanksgiving for the harvest. It was also called the Feast of Weeks, because it was celebrated seven weeks after the passover. It is also a festival of the Christian church, occurring fifty days after Easter, in commemoration of the descent of the Holy Ghost on the disciples, called in England Whitsuntide.

PENTLAND FIRTH, a channel separating the mainland of Scotland from the Orkney islands, and connecting the North Sea with the Atlantic ocean. It is about 17 miles long east to west, and 6 to 8 miles broad. A current, setting from east to west, flows through it with a velocity of 3 to 9 miles an hour, causing many eddies, and rendering its navigation difficult and dangerous.

PENUM'BRA, the partial shadow between the full light and the total shadow caused by an opaque body intercepting the light from a luminous body, the penumbra being the result of rays emitted by part of the luminous body. An eye placed in the penumbra would see part of the luminous body, part being eclipsed by the opaque body; an eye placed in the "umbra," or place of total shadow, would receive no rays from the luminous body; an eye placed



Umbra and penumbra.

anywhere else than in the penumbra and umbra sees the luminous body without eclipse. The subject is of importance in the consideration of eclipses. In a partial eclipse of the sun, as long as any part of the same is visible the parties observing are in the penumbra; when the eclipse is total, in the umbra. The cut shows the phenomena of the umbra and penumbra in the case of a luminous body between two opaque bodies, the one larger, the other smaller than itself. See also Eclipse.

PENZA, a government of Russia, bounded by Nijni-Novgorod, Tambov,

THE NUMBER OF PENSION CLAIMS, PENSIONERS, AND DISBURSEMENTS, 1861-1905, ARE AS FOLLOWS:

Fiscal Year Ending June 30	Total Number of Applica- tions Filed	Total Number of Claims Allowed	Number of Pensioners on the Roll			Disbursements
			Invalids	Widows, Etc.	Total	
1861	.....	.....	4,337	4,299	8,636	\$1,072,461.55
1862	2,487	462	4,341	3,818	8,159	790,384.76
1863	49,332	7,884	7,821	6,970	14,791	1,025,139.91
1864	53,599	39,487	23,479	27,656	51,135	4,504,616.92
1865	72,684	40,171	35,880	50,106	85,986	8,525,153.11
1866	65,256	50,177	55,652	71,070	126,722	13,459,969.43
1867	36,753	36,482	69,565	83,618	153,183	18,619,956.46
1868	20,768	28,921	75,957	93,686	169,643	24,010,981.99
1869	26,066	23,196	82,859	105,104	187,963	28,422,884.08
1870	24,851	18,221	87,521	111,165	198,686	27,780,811.81
1871	43,969	16,562	93,394	114,101	207,495	33,077,383.63
1872	26,391	34,333	113,954	118,275	232,299	30,169,341.00
1873	18,303	16,052	119,500	118,911	238,411	29,185,289.62
1874	16,734	10,463	121,628	114,613	236,241	30,593,749.56
1875	18,704	11,153	122,989	111,832	234,821	29,683,116.63
1876	23,523	9,977	124,239	107,898	232,137	28,351,599.69
1877	22,715	11,326	128,723	103,381	232,104	28,580,157.04
1878	44,587	11,963	131,649	92,349	223,998	26,844,415.18
1879	57,118	31,346	138,615	104,140	242,755	33,780,526.19
1880	141,466	19,545	145,410	105,392	250,802	57,240,540.14
1881	31,116	27,394	164,110	104,720	268,830	50,626,538.51
1882	40,939	27,664	182,633	103,064	285,697	54,296,280.54
1883	48,776	38,162	206,043	97,616	303,658	60,431,972.85
1884	41,785	34,192	225,470	97,286	323,756	57,273,536.74
1885	40,918	35,767	247,146	97,979	345,125	65,693,706.72
1886	49,895	40,857	270,346	95,437	365,783	64,584,270.45
1887	72,465	55,194	306,298	99,709	406,007	74,815,486.85
1888	75,726	60,252	343,701	108,856	452,557	79,646,146.37
1889	81,220	51,921	373,699	116,026	489,725	89,131,968.44
1890	105,044	66,637	415,654	122,290	537,944	106,493,890.19
1891	696,941	156,486	536,821	139,339	676,160	118,548,959.71
1892	246,638	224,047	703,242	172,826	876,068	141,086,948.84
1893	119,361	121,630	759,706	206,806	966,512	158,155,342.51
1894	57,141	39,085	754,382	215,162	969,544	140,772,163.78
1895	45,361	39,185	750,951	219,567	970,524	140,959,361.00
1896	42,244	40,374	747,967	222,557	970,678	139,280,075.00
1897	50,585	50,101	746,829	229,185	976,014	140,845,772.00
1898	48,732	52,648	760,853	232,861	993,714	145,748,865.56
1899	53,881	37,077	753,451	238,068	991,519	139,482,696.00
1900	51,964	40,645	751,864	241,674	993,529	139,381,522.73
1901	58,373	44,868	747,990	249,736	997,735	139,582,231.98
1902	47,965	40,173	738,809	260,637	999,446	138,491,822.48
1903	52,325	40,136	728,732	267,813	996,545	138,890,088.64
1904	55,794	44,296	720,315	274,447	994,762	142,092,818.75
1905	52,841	50,027	717,158	281,283	998,441	142,099,286.05
Total	3,033,336	1,876,096	.....	.....	.....	\$3,264,130,257.90

the higher courts and upon many other civil officers who have performed their duties for a specified number of years and then resigned their active functions. They are also frequently granted to distinguished and meritorious authors, artists, scientific men, inventors, and

Bible, called also the Law of Moses, or simply the law. The division of the whole work into five parts has, by some authorities, been supposed to be original; others, with more probability, think it was so divided by the Greek translators, the titles of the several books being

Saratov, and **Simbirsk**; area, 14,996 sq. miles; pop. 1,491,215. About 60 per cent of the soil is arable, the chief crops being rye, oats, buckwheat, hemp, potatoes, and beet-root, and about 14 per cent is under meadows or grazing land. The forests are extensive. **Penza**, the capital, is on an eminence at the junction of the **Penza** and **Sura**, 440 miles southeast of **Moscow**. Pop. 61,851.

PE'ONY, a genus of plants very generally cultivated for the sake of their large showy flowers. The species are mostly herbaceous, having perennial tuberous roots and large deeply-lobed leaves. The flowers are solitary, and of a variety of colors, crimson, purplish, pink, yellow, and white. The flowers, however, have no smell, or not an agreeable one, except in the case of a shrubby species, a native of China, of several varieties, with beautiful whitish flowers stained with pink. The roots and seeds of all the species are emetic and cathartic in moderate doses.

PEOPLE'S PALACE, a building in the East End of London, situated in Mile-end Road, opened by the queen, May 1887. It provides for the population of the East End a hall for concerts, entertainments, etc., a library and reading-rooms, gymnasia, swimming-baths, social-meeting rooms, rooms for games, refreshment rooms, a winter-garden, technical schools, etc. The nucleus of the palace was the **Beaumont Institute** founded by Mr. J. T. B. Beaumont (died 1840), who left \$65,000 to establish an institution for the moral and intellectual improvement of the working-classes in the East End of London. A movement set on foot by a novel by Sir Walter Besant—*All Sorts and Conditions of Men*—resulted in raising the fund to \$375,000.

PEO'RIA, the capital of **Peoria** co., Illinois, on the west bank of the Illinois river (here called from its width **Lake Peoria**). **Peoria** is a great railway center, and is connected with **St. Louis** by river steamers and with **Chicago** by the **Michigan canal**. It is a rapidly rising place, the seat of a large grain traffic, and has great iron-works and other manufacturing establishments. Pop. 1909 about 75,000.

PEPPER, a genus of plants. The pepper which furnishes the black pepper of commerce, is a native of the East Indies, where it is cultivated on an



Black pepper.

extensive scale. It is a climbing plant with broad, ovate, acuminate leaves, and little globular berries, which, when ripe, are of a bright-red color. The

pepper of **Malacca**, **Java**, and especially of **Sumatra**, is the most esteemed. Its culture has been introduced into various other tropical countries. White pepper is the best and soundest of the berries, gathered when fully ripe, and deprived of their external skin. The **Chavica Betle**, or **betel**, belongs to the same natural order. **Cayenne pepper**, **Guinea pepper**, **bird pepper**, etc., are the produce of species of **Capsicum**. **Jamaica pepper** is **pimento** or **allspice**.

PEPPERMINT. See **Mint**.

PEP'SINE, an active principle of the gastric juice, a peculiar animal principle secreted by the stomach. The pepsine or pepsia of pharmacy is a preparation of the mucous lining of the stomach of the pig or calf. It is often prescribed in cases of indigestion connected with loss of power and tone of the stomach.

PEPYS (peps or pep'is), Samuel, secretary to the admiralty in the reigns of **Charles II.** and **James II.**, was born at **Brampton**, **Huntingdonshire**, 1632. He died in 1703. He was president of the **Royal Society** for two years; but his title to fame rests upon his **Diary** (1659-69), which is a most entertaining work, revealing the writer's own character very plainly, giving an excellent picture of contemporary life, and of great value for the history of the court of **Charles II.** It is in shorthand, was discovered among a collection of books, prints, and manuscripts bequeathed by **Pepys** to **Magdalene College**, **Cambridge** and was first printed in 1825.

PERÆ'A, a district of **Palestine** eastward of the **Jordan**, the "Gilead" of the **Old Testament**.

PERAK (pā'rāk), a native state of the **Malay peninsula**, extending about 80 miles along the west coast, and stretching inward to the mountain range which forms the backbone of the peninsula; area, 7949 sq. miles, pop. 328,801. Since 1875 **Perak** has been practically a dependency of the **Straits settlements**, the native **rajah** being controlled by a **British resident** appointed by the governor of that colony.

PERCEPTION, in philosophy, the faculty of perceiving; the faculty by which we have knowledge through the medium or instrumentality of the bodily organs, or by which we hold communication with the external world. Perception takes cognizance only of objects without the mind. We perceive a man, a horse, a tree; when we think or feel, we are conscious of our thoughts and emotions. Two great disputes are connected with perception, both brought into full prominence by **Bishop Berkeley**. The first is the origin of our judgments of the distances and real magnitudes of visible bodies. The second question has reference to the grounds we have for asserting the existence of an external material world, which, according to **Berkeley**, was connected with the other. See **Idealism**.

PER'CEVAL, **Spencer**, English statesman, son of **John Perceval**, **Earl of Egmont**, born 1762. In 1801 he became solicitor-general, and in 1802 attorney-general. In 1807 he was appointed chancellor of the exchequer, and on the death of the **Duke of Portland**, in 1809,

he became premier. In this post he continued till May 11, 1812, when a person named **Bellingham** shot him dead with a pistol in the lobby of the **House of Commons**.

PERCH, a genus of fishes, forming the type of the perch family. The common perch is a common tenant of freshwater lakes and rivers. The body is broad, and somewhat flattened laterally. There are two dorsal fins, the anterior



Perch.

supported by very strong spines. It is colored a greenish-brown on the upper parts, the belly being of a yellowish or golden white. The sides are marked with from five to seven blackish bands. The average weight is from 2 to 3 lbs. The perch is a voracious feeder, devouring smaller fishes, worms, crustaceans, etc.

PERCUSSION, in medicine, that method of diagnosis which consists in striking gently on the surface of one of the cavities of the body, and then endeavoring to ascertain from the sound produced the condition of the organ lying beneath. Percussion is most frequently used on the chest, but it is also occasionally applied to the cavity of the abdomen, the head, etc.

PERCUSSION CAPS, are small copper cylinders, closed at one end for conveniently holding the detonating composition which is exploded by percussion so as to ignite the powder in certain kinds of fire-arms. The copper cap came into general use between 1820 and 1830.

PERENNIAL, in botany, a term applied to those plants whose roots subsist for a number of years, whether they retain their leaves in winter or not. Those which retain their leaves are called evergreens, such as cast their leaves are called deciduous. Perennial herbaceous plants, like trees and shrubs, produce flowers and fruit year after year.

PERFUMES, substances emitting an agreeable odor, and used about the person, the dress, or the dwelling. Perfumes of various sorts have been held in high estimation from the most ancient times. The **Egyptians**, **Hebrews**, **Phœnicians**, **Assyrians**, and **Persians** are known to have made great use of them, as did also the **Greeks** and **Romans**. In the middle ages **France** and **Italy** were most conspicuous for the use and preparation of perfumes. Perfumes are partly of animal but chiefly of vegetable origin. They may be divided into two classes, crude and prepared. The former consist of such animal perfumes as muck, civet, ambergris, and such vegetable perfumes as are obtained in the form of essential oils. The prepared perfumes, many of them known by fancy names, consist of various mixtures or preparations of odorous substances made up according to recipe.

PERGUNNAHS (**Parganá**s), The **Twenty-four**, a district of **India**, forming

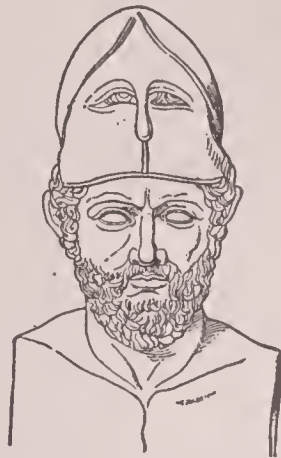
the metropolitan district of the lieutenant-governorship of Bengal; area, 2128 sq. miles. Pop. (exclusive of Calcutta), 1,892,033.

PERICARDITIS, inflammation of the membranous sac containing the heart. In the acute stage of the disease there is exudation of lymph or serum; at a later stage false membranes are formed; and at a still later stage the two sides become glued together, forming adherent pericardium. This is generally followed by changes in the substance of the heart or in its internal surface, orifices, or valves, and a fatal termination is rarely long delayed. The symptoms of pericarditis are: 1st, pain more or less acute, in the situation of the heart; fever is present with loss of appetite and dry tongue. An anxious respiration and a feeling of overwhelming oppression are also present, with frequent sighing, which gives momentary relief. Most of the symptoms are aggravated by motion or a high temperature. For the diagnosis of pericarditis we must rely mainly on the physical signs, but it is only when the effusion is considerable that investigation by percussion is of much use. In ordinary cases, where adhesion takes place, there may be an apparently complete recovery at the end of three weeks or less; but adhesion frequently gives rise to other structural changes of the heart, and then fatal disease of that organ almost always follows. In slight cases a real cure without adhesion may be effected. This disease is frequently brought on by exposure to cold or draughts when the body is warm and perspiring. Its most frequent occurrence is in connection with acute rheumatism.

PERICARDIUM, the investing fibrous sac or bag of the heart in man and other animals. In man it contains the heart and origin of the great vessels. It consists of two layers an outer or fibrous and an inner or serous layer. The inner surface of the membrane secretes a serous fluid, which in health is present only in sufficient quantity to lubricate the heart, and so to facilitate its movements within the sac.

PERICLES (-klēz), one of the most celebrated statesmen of ancient Greece, born at Athens about 494 B. C. He was connected by family relations with the aristocracy, but as Cimon was already at its head he endeavored to gain the favor of the popular party. In this he fully succeeded by his eloquence, abilities, and political tactics, so that on the death of Cimon, in 449 B.C., Pericles became virtual ruler of Athens. By his great public works he flattered the vanity of the Athenians, while he beautified the city and employed many laborers and artists. His chief aim was to make Athens undoubtedly the first power in Greece, as well as the chief center of art and literature, and this position she attained and held for a number of years. At the commencement of the Peloponnesian war (B.C. 431), in which Athens had to contend against Sparta and other states, Pericles was made commander-in-chief. The Spartans advanced into Attica, but Pericles had made the rural population take refuge in Athens and refused battle. After they retired he led

an army into Megaris, and next year he commanded a powerful fleet sent against the Peloponnesus. In 430 B.C. a plague broke out at Athens, and for a brief period Pericles lost his popularity and was deprived of the command. The people, however, soon recalled him to the head of the state, but amid his numerous civil cares he was afflicted by



Pericles—Antique bust.

domestic calamities. Many of his friends and his two sons, Xanthippus and Paralus, were carried off by the plague; and to console him for this loss the Athenians allowed him to legitimize his son by Aspasia. He now sunk into a lingering sickness, and died B.C. 429, in the third year of the Peloponnesian war. Pericles was distinguished by intellectual breadth, elevated moral tone, unruffled serenity, and superiority to the prejudices of his age. His name is intimately connected with the highest glory of art, science, and power in Athens.

PERIER (pā-ri-ā), Casimir, French statesman, was born at Grenoble in 1777; educated at Lyons; and served with honor in the campaigns of Italy (1799 and 1800). In 1802 he established a prosperous banking-house in company with his brother. In 1817 he was elected to represent the department of the Seine in the Chamber of Deputies. Here he became one of the leaders of the opposition under Charles X., and was no less distinguished as the firm and eloquent advocate of constitutional principles than as an enlightened and sagacious financier. After the revolution of 1830 he was prime-minister to Louis Philippe from March 13, 1831, to his death by cholera, May 16, 1832.

PERIGEE (-jē), that point in the orbit of the moon which is at the least distance from the earth. See Apogee.

PERIHELION, that part of the orbit of the earth or any other planet in which it is at the point nearest to the sun. The "perihelion distance" of a heavenly body is its distance from the sun at its nearest approach.

PERIMETER, in geometry, the bounds or limits of any figure or body. The perimeters of surfaces or figures are lines; those of bodies are surfaces.

PERIOD, in astronomy, the interval of time occupied by a planet or comet in traveling once round the sun, or by a satellite in traveling round its primary.

PERIODICALS, publications which appear at regular intervals, and whose

principal object is not the conveyance of news (the main function of newspapers), but the circulation of information of a literary, scientific, artistic, or miscellaneous character, as also criticisms on books, essays, poems, tales, etc. Periodicals exclusively devoted to criticism are generally called reviews, and those whose contents are of a miscellaneous and entertaining kind magazines; but there is no great strictness in the use of the term. The first periodical was published in France, being a scientific magazine, the *Journal des Savants*, issued in 1665, and still existing in name at least. The most famous French literary periodical is the *Revue de Deux Mondes*, begun in 1829, from 1831 issued fortnightly, and marked by an ability which has placed it in the front rank of the world's periodicals. Into it tales, poems, etc., are admitted, and the names of the contributors have to be attached to their articles. The earliest English periodical seems to have been the *Weekly Memorials for the Ingenious*, the first number of which is dated January, 1681-82, and which lasted but a year. In 1802 was introduced the *Edinburgh Review*, which came out every three months, and soon had a formidable rival in the *Quarterly Review* (1809). To meet the demand for critical literature at shorter intervals than three months, there was published in 1865 the *Fortnightly Review*, which for about a year was true to its name, but has since appeared monthly. The first English magazine properly speaking may be said to be the *Gentleman's Journal*, or *Monthly Miscellany*, commenced in 1692. The most noted American reviews and magazines are the *North American Review*, *The World's Work*, *Harper's Magazine*, the *Atlantic Monthly*, *Lippincott's Magazine*, *Scribner's Magazine*, the *Century Magazine*, the *Forum*, etc., etc.

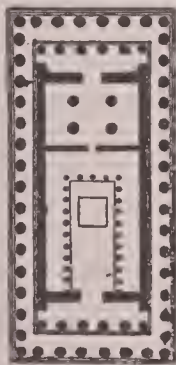
PERIODICITY, the disposition of certain things or phenomena to recur at stated periods. As a physiological and pathological term it denotes the regular or nearly regular recurrence of certain phenomena of animal life, such as sleep and hunger. The first indication of a diseased state is generally a disturbance of the natural or acquired periodicity of the various functions of life.

PERIOSTEUM, the fibrous membrane investing the bones, and which serves as a medium for the transmission of the nutritive blood-vessels of the bone. The periosteum firmly adheres to the surface of bones (including the inside of the long bones), save at their glistly or cartilaginous extremities, and it becomes continuous with the tendons or ligaments inserted into bones. When the periosteum, through disease or injury, becomes affected, the blood supply and nutrition of the bone suffer, and in consequence the bone-tissue dies or becomes necrosed, and is exfoliated or thrown off. When a bone is fractured the periosteum plays an important part in the repair of the injury, new osseous material being deposited by the membrane.

PERIOSTITIS, inflammation of the periosteum, a painful ailment frequently brought on by sudden exposure to cold after being heated.

PERIPATETIC PHILOSOPHY, the philosophy of Aristotle and his followers, so called, it is believed, because he was accustomed to walk up and down with his more intimate disciples, while he expounded to them his doctrines. The philosophy of Aristotle starts from his criticism of the Platonic doctrine of ideas, in combating which he is led to the fundamental antithesis of his philosophy, that between matter and form. The notion or idea of a thing is not, he says, a separate existence different from the thing itself, but is related to the thing only as form to matter. Every sensible thing is a compound of matter and form, the matter being the substance of which the thing consists, while the form is that which makes it a particular thing (a stone, for example, and not a tree), and therefore the same as its notion or idea. The form is the true nature of a thing. Origination is merely matter acquiring form, it is merely a transition from potential to actual existence. Everything that actually exists previously existed potentially in the matter of which it is composed. Matter is thus related to form as potentiality to actuality. And as there is, on the one hand, formless matter, which is mere potentiality without actuality, so, on the other hand, there is pure form, which is pure actuality without potentiality. This pure form is the eternal Being, styled by Aristotle the first or prime mover.

PERIP'ETERAL, in Greek architecture, a term signifying surrounded by a row of columns: said of a temple or other building, especially of a temple the cella



Plan of peripteral temple.

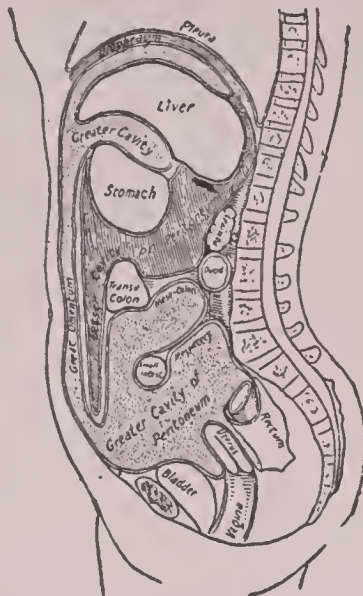
of which is surrounded by columns, those on the flanks (or sides) being distant one intercolumniation from the wall.

PERISTAL'TIC (or Vermicular) **MOTION**, the name given to certain movements connected with digestion observed in the stomach and intestines, which proceed with a wave-like or spiral motion, the object being gradually to propel forward the contents of these viscera.

PER'ISTYLE, in architecture, a range of columns surrounding the exterior or interior of anything, as the cella of a temple. It is frequently but incorrectly limited in signification to a range of columns round the interior of a place, as an open court.

PERITONE'UM, the serous membrane lining the abdominal cavity and cover-

ing the intestines. Like all other serous membranes, the peritoneum presents the structure of a closed sac; one layer (parieta) lining the abdominal walls, the other or visceral layer being reflected over the organs of the abdomen. A



Peritoneum of human female, in longitudinal section, somewhat diagrammatical.

cavity—the peritoneal cavity—is thus inclosed between the two layers of the membrane, and this contains in health a quantity of serous fluid just sufficient to moisten its surfaces.

PERITONI'TIS, a common and very frequently fatal disease caused by inflammation of the peritoneum. The latter is a great membrane, very thin, and in the form of a closed sac, of the same structure as the pleural membrane and the pericardium. This membrane encloses the viscera, or contents, of the abdominal cavity; but the viscera are not within the cavity of the sac, but are invested by the outside of the sac, much the same as if one were to wrap up several objects in a deflated football. It is clear that the cavity of the football would not enclose the objects, but that the interior walls of the football would be everywhere in contact. When foreign bodies, most frequently bacteria, or disease germs, find their way into the cavity of the peritoneum, the membrane becomes inflamed, the interior surfaces often adhere to each other, the intestines become deranged, fever follows, and unless prompt treatment is resorted to death ensues, especially in acute peritonitis. In acute peritonitis the first symptoms are chill and pain in the abdomen, more intense pain on pressure, and pain on breathing. The appearance of the patient's face is characteristic: "Sharp nose, hollow eyes, collapsed temples, ears cold and turned out, skin of the forehead rough, distended, and parched, the color of the face brown, black, livid, or lead-colored." Acute peritonitis is usually fatal in two to ten days, death being very sudden.

Chronic peritonitis is caused principally by germs, and is not painful except occasionally. The treatment for the acute form is local application of ice bags and calomel or salts. Chronic

peritonitis frequently yields readily to treatment.

PERJURY, the act or crime of wilfully making a false oath in judicial proceedings in a matter material to the issue or cause in question. The penalties of perjury attach to wilful falsehood in an affirmation made by a Quaker or other witness where such affirmation is received in lieu of an oath. Perjury is a misdemeanor punishable at common law, by fine or imprisonment, but several acts provide for additional punishment. Popularly, the mere act of making a false oath, or of violating an oath, provided it be lawful, is considered perjury.

PERM, an eastern government of Russia, partly in Europe and partly in Asia; area, 128,211 sq. miles. The government is rich in minerals, comprising iron, silver, copper, platinum, nickel, lead, and gold. Pop. 3,003,208.—Perm, the capital of the government, is situated on the Kama, 930 miles north-east of Moscow. It has flourishing industries in iron, steel, leather, etc. In the neighborhood is a government manufactory of steel guns and munitions of war. Pop. 45,403.

PERMANENT WHITE, a white pigment consisting of sulphate of barium precipitated from the chloride by adding dilute sulphuric acid.

PERNAMBUCO, a town in Brazil, the capital of the state of the same name, on the east coast. It consists of three distinct parts: Recife, occupying a small peninsula; San Antonio, on an island; and Boa Vista, on the mainland, the three parts being connected by iron bridges. The harbor is formed by the reef, which incloses a belt of water about a mile in width. The trade is extensive. Pop. 130,000.—The state has an area of about 46,000 square miles. The principal cultivated crops are the sugar-cane and cotton. Pop. 1,014,700.

PEROX'IDES, the general name applied to the binary compounds of oxygen containing the greatest amount of that element.

PERPENDIC'ULAR, in geometry, a line falling directly on another line, so as to make equal angles on each side. A straight line is said to be perpendicular to a curve, when it cuts the curve in a point where another straight line to which it is perpendicular makes a tangent with the curve. In this case the perpendicular is usually called a normal to the curve.

PERPENDICULAR STYLE, in architecture, a variety of the pointed Gothic, the latest variety to be introduced, sometimes called the florid or Tudor style of Gothic. It prevailed in England from about the end of the 14th to the middle of the 16th century. It is chiefly characterized by the predominance of straight lines in the design, and especially in its tracery. Another feature is the lofty square towers of its churches, divided into stages by bands, and each stage filled with windows. The mullions of the windows are vertical, generally rise to the main arches, and are often crossed by horizontal bars or transoms. Large windows are a distinctive feature of this style. The tracery of the doors is

similar to that of the windows. There are two kinds of roof peculiar to the



Perpendicular style.

style—the vaulted roof, with fan-tracery, and the open timber-roof.

PERPETUAL MOTION, motion that, once originated, continues forever or indefinitely. The problem of a perpetual motion consists in the invention of a machine which shall have the principles of its motion within itself, and numberless schemes have been proposed for its solution. It was not till the discovery of the principle of the conservation of energy (see Energy, Conservation of), experimentally proved by Joule, that the impossibility of the existence of a perpetual motion was considered to be a physical axiom. This principle asserts that the whole amount of energy in the universe, or in any limited system which does not receive energy from without, or part with it to external matter, is invariable. But every machine when in action does a certain amount of work, if only in overcoming friction and the resistance of air, and as the perpetual motion machine can start with only a certain amount of energy, this is gradually used up in the work it does. A machine, in short, would be required in which there was no friction, and which met with no resistance of any kind. The mechanical arrangements which have been put forward as perpetual motions by inventors are either, (1) Systems of weights, which are allowed to slide on a wheel into such positions relatively to the axis of the wheel as to produce a constant turning moment in one direction; (2) Masses of liquid moving in wheels on the same principle; (3) Masses of iron arranged on the same principle, but subjected to the attractions of magnets instead of their own weights. Numbers of patents for such machines are constantly being taken out, but in every case inventors show an ignorance of the most elementary principles of natural philosophy.

PERRY, Matthew Calbraith, American naval officer was born in Rhode Island, in 1794. He was a younger brother of Com. Oliver Hazard Perry. In 1809 he became midshipman, and in 1813 was made lieutenant. In 1853 Commodore Perry organized and commanded the famous expedition to Japan that opened that country to intercourse with the civilized world. On his return a

report of the expedition was published by the United States government, in three volumes, entitled Report of Commodore Perry's Expedition to Japan. He died in 1858.

PERRY, Oliver Hazard, American naval officer, was born in South Kingston, R. I., in 1785. On April 7, 1799, he received his commission as midshipman, and on January 15, 1807, was promoted lieutenant. After building a fleet of gunboats, he commanded the schooner *Revenge*, that, in 1810, cruised off the southern coast of the United States. This vessel was wrecked on a reef near Watch Hill, R. I., January 8, 1811, but Perry was honorably acquitted of neglect or carelessness by a court of inquiry. Thereafter he repeatedly applied for a command at sea, which was refused, and eventually offered his services to Com. Isaac Chauncey on the lakes, who ordered him for duty to Lake Erie. Here at Erie, he superintended the building of a number of small vessels, the largest of which were of 500 tons burden; with them he expected to encounter the British flotilla, under Captain Barclay. Perry's squadron consisted of nine vessels of 1,671 tons, with 54 guns. On the British side Capt. Robert Heriot Barclay had a flotilla of six vessels of 1,460 tons, manned by 450 men and 63 pieces of cannon. On September 10, 1813, the American forces moved out of Put-in-Bay for action, and after a hard-fought



O. H. Perry

contest, on the afternoon of that day the British flotilla surrendered. Captain Barclay was wounded in the action. Congress bestowed on Perry the rank of captain, and the British, having lost control of Lake Erie, evacuated Detroit. Perry served in the Mediterranean under Decatur, and in 1819 was sent, in command of a squadron, to the Caribbean sea, where, on the Orinoco river, he died of yellow fever.

PERSECUTIONS, the name usually applied to periods during which the early Christians were subjected to cruel treatment on account of their religion. Ten of these are usually counted. The first persecution (64-68) was carried on under Nero. The cruelties practiced on this occasion are worthy of the ferocious

instincts of that notorious tyrant. The apostles Peter and Paul suffered in this persecution. The second persecution (95-96) was raised by the Emperor Domitian. Many eminent Christians suffered; and it is generally held that St. John was exiled to Patmos at this time. The third persecution began in the third year of Trajan (100). This persecution continued for several years, with different degrees of severity in many parts of the empire, and the severity of it appears from the great number of martyrs mentioned in the old martyrologies. The fourth persecution, under Marcus Aurelius (161-180), at different places, with several intermissions and different degrees of violence, continued the greatest part of his reign. It raged with particular fury in Smyrna and Lyons, and Vienne in Gaul. Polycarp and Justin Martyr are famous victims of this period. The fifth began in 197 under Severus. During the sixth persecution, under Maximian (235-238), only Christian teachers and ministers were persecuted. Decius began his reign (249) with a persecution of the Christians (the seventh) throughout his dominions. This was the first really general persecution. Valerian in 257 put to death few but the clergy (eighth persecution); and the execution of the edict of Aurelian against the Christians (274)—the ninth persecution, as it was called—was prevented by his violent death. A severe persecution of the Christians (the tenth) took place under the Emperor Diocletian (303). Throughout the Roman empire their churches were destroyed, their sacred books burned, and all imaginable means of inhuman violence employed to induce them to renounce their faith. Persecutions, principally directed against the clergy, continued with more or less vigor until Constantine the Great (312 and 313) restored to the Christians full liberty and the use of their churches and goods; and his conversion to Christianity made it the established religion in the Roman empire.

PERSEPHONE, in Greek mythology, the daughter of Zeus and Demeter (Ceres). While she was gathering flowers near Enna in Sicily Pluto carried her off to the infernal regions, with the consent of Zeus, and made her his wife, but in answer to the prayers of Demeter she was permitted to spend the spring and summer of each year in the upper world. In Homer she bears the name of Persephoneia. The chief seats of the worship of Persephone were Attica and Sicily. In the festivals held in her honor in autumn the celebrants were dressed in mourning in token of lamentation for her being carried off by Pluto, while at the spring festivals they were clad in gay attire in token of joy at her return. In works of art Persephone is sometimes represented as sitting by the side of her husband, and sometimes alone.

PERSEUS (per'sūs), an ancient Greek hero, son of Danaë and Zeus. He was set adrift in the sea on his birth, in a chest along with his mother. But the chest reached the Island of Seriphos, and Perseus was brought up by the king of the island, who exacted a promise from him to fetch the head of the Gorgon

Medusa. This he accomplished under the guidance of Hermes and Athena, and with the assistance of the nymphs. He also delivered Andromeda from a sea-monster (see Andromeda), an exploit which is frequently figured in ancient art. He was king of Tiryns and founder of Mycenæ. After his death Perseus was worshipped as a hero, and placed among the stars.

PERSEUS, the last king of the Macedonians, and an illegitimate son of Philip V., succeeded his father B.C. 178, and entered keenly into the hostilities which had previously broken out against Rome. The Romans sent an army against him and gained a signal victory at Pydna 168 B.C. Perseus fled to Samothrace, but was given up to the Romans, and some years after died in captivity at Alba, near Rome.

PERSEUS, a northern constellation surrounded by Andromeda, Aries, Taurus, Auriga, Camelopardalus, and Cassiopeia.

PERSIA, a kingdom of Western Asia; bounded north by Transcaucasian Russia, the Caspian, and Russian Central Asia; east by Afghanistan and Baluchistan; south by the Persian Gulf; and west by Asiatic Turkey; extending for 700 miles from n. to s. and 900 miles from e. to w.; area, about 636,000 sq. miles; pop. from 7,000,000 to 9,000,000. The country is divided into 33 provinces, capital Teheran (pop. 150,000 to 200,000); chief trade centers, Teheran, Tabreez, Ispahan; chief ports, Bushire and Bender Abbas on the Persian Gulf. Other large towns are: Meshed, Balfroosh, Kerman, Yezd, Hamadân, Shirâz, Kazvin, Kom, Resht.

Persia may be considered as an elevated plateau, broken by clusters of hills or chains of rocky mountains, which alternate with extensive plains and barren deserts; the desert of Khorassan in the northeast alone absorbs about one-seventh of the entire area. Low tracts exist on the Persian gulf and the Caspian sea. The interior plains have an elevation of from 2000 to 6000 feet above the sea. This vast central plateau is supported in the n. and s. by two great mountain chains or systems, and from these all the minor ranges seem to spring. The north chain, an extension of the Hindu Kush, enters Persia from Northern Afghanistan, proceeds across the country, and reaches its greatest elevation on the south of the Caspian, where it takes the name of the Elburz mountains, and attains in Mount Demavend a height of nearly 20,000 feet. Still further west it becomes linked with the mountains of Ararat. The other great mountain system runs from northwest to southeast nearer the Persian gulf, is of considerable width, and forms several separate ranges. In one of these an elevation of 17,000 feet is reached. The rivers are few and insignificant. Not one of them is of any navigable importance, except the Euphrates, which only waters a small portion of the southwest frontier, and the Karun, recently opened to the navigation of the world. The latter is entirely within Persian territory, and flows into the Shat-el-Arab, or united Tigris and Euphrates. Of the streams which flow

northward into the Caspian the only important one is the Kizil-Uzen or Sefid Rud (White river), which has a course of about 350 miles. There are a great number of small fresh-water lakes, and a few very extensive salt lakes, the largest being Urumiah in the extreme northwest.

The climate varies considerably in different provinces, and in the central plateau intense summer heat alternates with extreme cold in winter. The mineral wealth of Persia is but little developed. Iron, copper, lead, antimony are abundant; sulphur, naphtha, and rock-salt unlimited; coal also exists. The turquoise mines of Nishapur are about the only ones receiving anything like adequate attention. The interior of Persia, particularly its eastern and southern regions, is mostly devoid of vegetation over large areas; the southwest has its forests of stunted oaks and other trees, and jungle; but on the Caspian the mountain sides are covered with dense and magnificent woods of oak, beech, elm, and walnut, intermingled with box-trees, cypresses, and cedars. Lower down wheat and barley are extensively cultivated. In the level and rich plains below the sugar cane and orange come to perfection; the pomegranate grows wild; the cotton-plant and mulberry are extensively and successfully cultivated, and large tracts are occupied by the vine, and orchards producing every kind of European fruit. In the low plains the only grain under extensive and regular culture is rice; the principal subsidiary crops are cotton, indigo, opium, sugar, madder, and tobacco. Excellent dates are produced on the southern coast tracts. Irrigation is well understood and extensively practiced. The domestic animals are: sheep, chiefly of the large-tailed variety; goats, some of which produce a wool little inferior to that of Cashmere; asses and mules of a large and superior description; horses of Arab, Turkoman and Persian breeds, and camels. Wild animals include the lion, leopard, wolf, jackal, hyena, bear, porcupine, wild ass, gazelle, etc.

The manufactures of Persia were once celebrated, but excepting some carpets and shawls it may be said that the country has ceased to export manufactured articles. Its chief exports now are rice, dried fruits, opium, silk, wool, cotton, hides, pearls, and turquoises. Chief imports: textiles, china and glass, carriages, sugar, tea, coffee, petroleum, drugs, and fancy articles. The internal trade of the country is almost entirely carried on by caravans, the beasts of burden being horses, camels, and mules. Railways are as yet hardly known in Persia, and good roads are almost equally rare.

The government of Persia is an absolute monarchy. The only control to which its ruler, the Shah, is subject are the precepts of the Koran. He surrounds himself with a certain number of advisers, forming a ministry, eleven of whom are heads of special departments. These ministers he calls and dismisses at pleasure. The army on a war footing is supposed to number 60,000 men.

The population is chiefly made up of Iranians or pure Persians and Turanians (Turkish and Tartar tribes), and in religion belongs almost exclusively to the Shiah sect of Mohammedans, or more properly to a subdivision of that sect. The priesthood is very influential and very bigoted. Education is comparatively well attended to, Persia being considered, next to China, the best-educated country in Asia. The Persians are rather short and slender built, fair in complexion, hair long and straight, but beard bushy, and almost invariably jet black. The women are beautiful, intellectual, and polite. The Persian is celebrated for his affable manners, but also for his craft and deceit. Polygamy is both authorized and encouraged.

The Persian empire was founded by Cyrus (559-29 B.C.), and existed under his successors of the Achæmenean dynasty until Darius III. (338-30 B.C.) was overthrown by Alexander the Great. After the death of Alexander, Persia ultimately fell to his general Seleucus (312 B.C.), whose successors, the Seleucids, ruled over it till 236 B.C., when Arsaces I. founded the Parthian empire, of which Persia formed a part. The Parthian empire continued till 226 A.D., when Persia once more gained the ascendancy under Ardashér Babigán, whose descendants, the Sassanids, continued to rule till the 7th century, when Persia was conquered by the Caliph Omar, and became a province of the Mohammedan empire. The Arab conquest made a deep and lasting impression on Persia. Under its influence the old Persian religion was given up in favor of Mohammedanism. About the beginning of the 9th century Persia began to be broken up into numerous petty states, and became the prey of successive conquerors—the Seljuk Turks (1037); Genghis Khan (1220); Tamerlane (1387); and the Turkomans, who were succeeded by the Sufi dynasty, (1501-1736). Ismail Sufi, the first sovereign of this dynasty, assumed the title of Shah, and introduced the Shiite or Shiah sect, or sect of Ali, Mohammed's son-in-law, from whom he pretended to be descended. Nadir Shah ascended the throne in 1736, and restored Persia to something of her former importance, but he was murdered in 1747, and his death was succeeded by a long period of anarchy, only broken by the reign of Kerim Khan, until Agha Muhammed, a Turkoman eunuch, founded the present dynasty of the Kajars (1794). Agha Muhammed was murdered in 1797, and succeeded by his nephew, Fath Ali, whose reign was largely taken up with unsuccessful wars with Russia and Turkey. He died in 1835, and was succeeded by his grandson, Mohammed, in whose reign Russian influence became predominant at Teheran. His son Nâsred-din the reigning Shah, ascended the throne in 1848. His efforts to annex Herat led to a war between Great Britain and Persia, in which Bushire was taken by the British forces, and severe defeats were inflicted upon the Persian troops at Kooshab and Mohammerah. By the Peace of Paris (March 3, 1857), however, Persia renounced all claim to Herat. The bound-



ary between Persia and the Russian territory beyond the Caspian was settled in 1881.

PERSIAN GULF, a gulf separating Persia from Arabia, and communicating with the Indian ocean by the Strait of Ormuz, 35 miles wide; greatest length, 560 miles; medium breadth, 180 miles. It receives the waters of the united Euphrates and Tigris, and of a number of small streams; the principal port is Bushire. There are many islands in the gulf; the largest are: Kishim, Ormuz, and the Bahrein Isles; in the neighborhood of the latter there are lucrative pearl-fisheries.

PERSIAN POWDER, an efficacious insecticide introduced from the east, and prepared from the flowers of the roseum, a native of the Caucasus, Persia, etc.

PERSIAN WHEEL, or **NORIA**, the Puisaro of the south of France, a machine for raising water to irrigate gardens, meadows, etc., employed from time immemorial in Asia and Africa, and introduced by the Saracens into Spain and other European countries. It consists of a double water-wheel, with float-boards on one side and a series of buckets on the other, which are movable about an axis above their center of gravity. The wheel is placed in a stream, the water turns it, and the filled buckets ascend; when they reach the highest point, their lower ends strike against a fixed obstacle, and the water is discharged into a reservoir. In Portugal, Spain, South of France, and Italy, this contrivance is extensively used; and has been modified to enable it to draw water also from ponds and wells, animals supplying the motive power, and pots, leather or other bags taking the place of buckets.

PERSIGNY (per-sên-yê), Jean Gilbert Victor Fialin, Duc de, French statesman, born 1808, died 1872. In 1840 he shared Napoleon's expedition to Boulogne. On the outbreak of the revolution of February, 1848, he hastened to Paris, contributed largely to determine the vote by which Napoleon was elected president (10th December, 1849), and was also one of the most prominent actors in the coup d'état (December 2, 1851), by which he became Napoleon III. He held the office of minister of the interior from 1852-54, and again from 1860-63; was appointed member of the senate 1852, ambassador to Great Britain 1855. He was elevated to the rank of duke in 1863.

PERSIM'MON, the fruit of a tree (a species of ebony) inhabiting the United States of America, more especially the southern states, where it attains the height of 60 feet or more. The fruit is succulent, reddish, and about the size of a small plum, containing a few oval stones. It is powerfully astringent when green, but when fully ripe the pulp becomes soft, palatable, and very sweet.

PERSISTENCE, in physics, the continuance of an effect after the cause which first gave rise to it is removed; as, the persistence of the impression of light on the retina after the luminous object is withdrawn; the persistence of the motion of an object after the moving force is withdrawn.

PERSONATION. See False Personation.

PERSONIFICATION, in the fine arts, poetry, and rhetoric, the representation of an inanimate subject as a person. This may be done in poetry and rhetoric



Personification.—The "Church of Christ," from the west front of the cathedral of Notre Dame, Paris (13th century sculpture).

either by giving epithets to inanimate subjects which properly belong only to persons, or by representing them as actually performing the part of animated beings.

PERSPEC'TIVE, the art or science which teaches how to produce the representation of objects on a flat surface so as to affect the eye in the same manner as the object or objects themselves when viewed from a given point. Perspective is intimately connected with the arts of design, and is particularly necessary in the art of painting, as without correctness of perspective no picture can be entirely satisfactory. Perspective alone enables us to represent foreshortenings (see Foreshortening) with accuracy, and it is requisite in delineating even the simplest positions of objects. That part of perspective which relates to the form of the objects differs essentially from that which teaches the gradation of colors according to the relative distance of objects. Hence perspective is divided into mathematical or linear perspective, and the perspective of color or aerial perspective. The contour of an object drawn upon paper or canvas represents nothing more than such an intersection of the rays of light sent from the extremities of it to the eye, as would arise on a glass put in the place of the paper or canvas. Suppose a spectator to be looking through a glass window at a prospect without, he will perceive the shape, size, and situation of every object visible upon the glass. If the objects are near the window the spaces they occupy on the glass will be larger than those occupied by similar objects at a greater distance; if they are parallel to the window, their shapes upon the glass will be parallel likewise; if they are oblique, their shapes will be oblique;

and so on. As the person alters his position, the situation of the objects upon the window will be altered also. The horizontal line, or line corresponding with the horizon, will in every situation of the eye be upon a level with it, that is, will seem to be raised as far above the ground upon which the spectator stands as his eye is. Now suppose the person at the window keeping his head steady draws the figure of an object seen through it upon the glass with a pencil, as if the point of a pencil touched the object, he would then have a true representation of the object in perspective as it appears to his eye. Representations of objects have, however, generally to be drawn on opaque planes, and for this purpose rules must be deduced from optics and geometry, and the application of these rules constitutes what is properly called the art of perspective. Linear perspective includes the various kinds of projections. Scenographic projection represent objects as they actually appear to the eye at limited distances. Orthographic projections represent objects as they would appear to the eye at an infinite distance, the rays which proceed from them being parallel instead of converging. It is the method on which plans and sections are drawn. A bird's-eye view is a scenographic or orthographic projection taken from an elevated point in the air from which the eye is supposed to look down upon the objects. Aerial perspective teaches how to judge of the degree of light which objects reflect in proportion to their distance, and of the gradation of their tints in proportion to the intervening air. By its application each object in a picture receives that degree of color and light which belongs to its distance from the spectator. The charm and harmony of a picture, particularly of a landscape, depend greatly upon correct aerial perspective.

PERSPIRATION, or **SWEAT**, the fluid secretion of the sweat glands of the skin. The term perspiration is, however, sometimes used to include all the secretions of the skin, such as those of the sebaceous glands or follicles, etc. The sweat-glands, situated in the subcutaneous adipose or fat tissue of the skin, consist of a coiled-up tube, invested by a capillary net-work of blood-vessels, and continued to the surface of the skin, where it opens in an oblique valvular aperture. The openings of the sweat-ducts constitute the popular "pores" of the skin. The largest and most numerous ducts are situated in the palm of the hand (Krause estimates 2736 to the square inch, Erasmus Wilson 3528). Perspiration is divided into insensible and sensible, the former being separated in the form of an invisible vapor, the latter so as to become visible by condensation in the form of little drops adhering to the skin. Water, fatty acids, carbonic acid, salts, etc., are removed from the body by the sweat, by which also the skin is kept moist. By the passing off of the sweat as vapor, heat is lost from the body, and thus the greater or less activity of the sweat glands plays an important part in regulating the bodily temperature. For

these reasons the regular process of perspiration is necessary for the preservation of good health. The constituents of sweat are to some extent dependent on the various bodily conditions and circumstances, hence the various results of analysis by different authorities. The quantity of sweat evolved from the skin has been estimated at nearly 2 lbs. daily.

PERTH, a city and royal and parliamentary burgh of Scotland, capital of the county of the same name. Perth is celebrated for its extensive dye-works. It manufactures woollens, winceys, hosiery, jute, table-linen, gauge-glasses for boilers, castings, etc. Till the death of James I., in 1437, it was the capital of Scotland, and both then and subsequently it became the scene of some of the most remarkable events in Scottish history. Pop. 32,872.—The county, which occupies the center of Scotland, has an extreme length, east to west, of 63 miles; breadth, north to south, 60 miles; area, 1,664,690 acres, of which 32,000 are water and 349,000 acres are under cultivation. Pop. 123,255.

PERTH AMBOY, a city and port of entry in Middlesex co., N. J., at the mouth of Raritan river; on Raritan bay, Staten Island Sound, and the Cent. of N. J., the Lehigh Valley, the Penn., and the Staten Island Rapid Transit railways; 21 miles s.w. of New York. It is in a fire-clay and kaolin region; has a large and excellent harbor; and contains terra-cotta works, large dry-docks, and immense coal and freight shipping dépôt and wharves of the Lehigh Valley railroad. Pop. 20,145.

PERTURBATIONS, the orbital irregularities or deviations of the planets from their regular elliptic orbits. These deviations arise, in the case of the primary planets, from the mutual gravitations of these planets toward each other, which derange their elliptic motions round the sun; and in that of the secondaries, partly from the mutual gravitation of the secondaries of the same system, similarly deranging their elliptic motions round their primary, and partly from the unequal attraction of the sun on them and on their primary. Of the planetary perturbations, the most important in a practical point of view are those which arise from the mutual attractions of the three bodies, the sun, the earth, and the moon.

PERU, a republic of South America, bounded on the north by Ecuador, on the west by the Pacific ocean, on the south by Chile, and on the east by Bolivia and Brazil; area, 683,145 sq. miles; estimated pop. in 1896, 2,900,000. The population consists of about 57 per cent aboriginal Indians, 23 per cent mixed Indian races, and 20 per cent of descendants of Spaniards, Europeans (chiefly Italians, French, and Spaniards), and Asiatics (chiefly Chinese).

This country exhibits great varieties of physical character. It is traversed throughout its length by the Andes, running parallel to and on an average 60 miles distant from the coast, the region between largely consisting of sandy desert, except where watered by transverse mountain streams. The Andes consist here of two main chains

or Cordilleras, connected by cross ranges, inclosing extensive and lofty valleys and plateaus. The Andes region is roughly estimated at about two-fifths of the entire area of Peru. The loftiest summits are in the southern portion of the W. Cordillera; several peaks attain there an altitude of nearly 20,000 feet, and the Chuquibamba rises to 21,000 feet. The most important districts are those of Pasco, of Cuzco, the valleys of the Rio Jauja, and of the Marañon or Amazon. The first of these lies at one of those points where the branches of the Andes unite, the ridges sinking into an elevated plain, which has here a general height of 14,000 feet. The veins of the precious metals, with which this region abounds, have attracted to it a comparatively dense population. The table-land of Cuzco descends from an elevation of less than



Peruvians.

12,000 feet in the s. to about 8000 feet in the n. Of the lakes Lake Titicaca (12,542 feet above sea-level), the largest in South America, and which partly belongs to Bolivia, is the only one of commercial importance. The chief rivers are the Marañon or main stream of the Amazon, and the Huallaga and Ucayale, which join the Marañon; the Ucayale, formed by the united waters of a number of streams (Apurimac, Urubamba, Paucartambo), being about the same size as that river. In the maritime region of Peru earthquake shocks are of common occurrence, and some of them have been of exceptional severity, the most disastrous being those of 1746, 1868, and 1877. Gold and silver occur in all the provinces of Peru, and form the chief wealth of the country. Quick-silver is also abundant. Copper, lead and iron also exist in various places.

The climate of Peru is as varied as its physical aspect. On a portion of the coast no rain has fallen within the memory of man, but the garua, a thick heavy mist often approaching to drizzling rain, is a partial compensation, and the rivers from the Andes afford means of irrigation for sugar and cotton plantations. The central plateau region has a mild and comparatively humid climate, but the higher regions are inclement and subject to terrific tempests. East of the Andes the regular equatorial winds from the east come loaded with humidity, and, checked by the mountains, pour down copious, and in some places perpetual rains.

Peru is incomparably rich in botany,

each region having its own flora. In the less elevated portions of the Eastern Andes a tropical vegetation is found; while on the higher parts representatives of alpine families (as the gentians) luxuriate. In the forests of Eastern Peru cinchona trees grow abundantly and supply the valuable bark from which the quinine is extracted. The same zone, especially the hot plains and swamps, also supply coca, the medicinal properties of which have for centuries been known to the natives of Peru and Bolivia who chew the leaves as a stimulant. Tobacco, cotton, sugar, rice, coffee, cocoa, and corn are grown in various parts and in increasing quantities. The eastern face of the Andes is as remarkable for its fauna as it is for its flora. The forests on the lower ranges and in the plains swarm with many species of parrots and monkeys; the tapir, sloth, ant-eater, armadillo, etc., are found here; the rivers are alive with alligators; and in the inundated plains the boa-constrictor attains a huge size. The puma and the South American bear inhabit the higher levels; the llama, the guanaco, the alpaca, and the vicuña, the still more elevated regions.

Peru exports precious metals, silver ores, copper, guano, wool of the sheep and the llama, alpaca, and vicuña, cotton, sugar, cinchona bark, rubber, coca leaves and cocaine, hides, chinchilla skins, etc. The chief imports are machinery, cotton, woolen, and linen goods, and provisions. The chief exports are minerals, sugar, wool, cotton, hides, cocaine, borax, coffee, and rice; imports, smallwares, cottons, provisions, woollens, etc. The foreign trade is chiefly carried on with Britain, Germany and the United States.

The government is based on a constitution adopted in 1867, and modeled on that of the United States. The legislative power is in the hands of a senate and a house of representatives. The president, elected for four years, is the head of the executive, and is assisted by two vice-presidents. By the laws of the republic the Indian is on a level in political rights with the white men; there exists absolute political but not religious freedom, the constitution prohibiting the exercise of any other religion than the Roman Catholic. There is, however a considerable amount of tolerance. Education is compulsory and free; there are universities at Lima, Arequipa, and Cuzco. The Peruvian language, of which there are many dialects, still maintains itself alongside of the language of the conquerors.

Of the early history of Peru we are almost entirely ignorant, but existing ruins, spoils secured by the Spaniards, and the descriptions left us by the historians of the Spanish conquest, sufficiently prove that the ancient Peruvians had no mean knowledge of architecture, sculpture, metal work, etc. They also had made considerable progress in astronomical science. The early religion of the Peruvians is bound up in the god Viracocha, the creator of the sun and the stars, and from him the Incas or emperors claimed descent as the sons of the sun. Under the Incas the empire was divided into four parts, corre-

sponding to the four cardinal points; each division had a separate government presided over by a viceroy of royal blood. All the land belonged to the Inca; and trade was carried on by barter, money being unknown. The thirteenth monarch of the Incas was reigning when the Spanish adventurer Pizarro disembarked in Peru in 1531. The Inca was taken prisoner (1532), numbers of his subjects were massacred, and the whole country fell in a short time into the hands of the invaders. It was then formed into a Spanish viceroyalty; subsequently part of it was incorporated in New Granada, and the viceroyalty of Buenos Ayres was constructed out of some of the provinces. In 1821 the country proclaimed its independence, but did not obtain actual freedom from Spanish rule until 1824, after a prolonged war. Since then Peru, like the rest of the South American republics, has suffered much from dissensions and revolutions. In the spring of 1879 it joined Bolivia in a war against Chile, resulting in the complete defeat of both the former. Peru had to cede by the peace of 1883 the province of Tarapacá absolutely to Chile, which also got possession provisionally of the department of Tacna. Since then Peru, though little troubled with external complications, has been disturbed by the ambitions of rival politicians, and even civil war.

PERUGINO (per-ū-jē'nō), Pietro Vannucci, surnamed *il Perugino*, the founder of the Roman school of painting, born at Città della Pieve (a dependency of Perugia) in 1446, died at Fontignano 1523. About 1480 Pope Sixtus IV. sent for him to Rome where he was employed along with Signorelli, Ghirlandaio, Botticelli, and Rosselli in decorating the Sistine Chapel with frescoes. Fine specimens of his frescoes are preserved in Perugia, Rome, Bologna, and Florence, and specimens of his other works are not infrequent in European galleries. Raphael is his most celebrated disciple.

PERUVIAN BARK. See Bark, Peruvian.

PERUZZI (pā-ru't'sē), Baldassari, architect and painter of the Roman school, born at Sienna 1481, died at Rome 1537. He went early to Rome and was employed in the decoration of various churches. He designed the Farnesina Villa on the banks of the Tiber, and he succeeded Raphael as architect of St. Peter's.

PESARO, a fortified town and seaport of Italy. The illustrious composer Rossini was born here in 1792. Pop. of town, 13,609.—The province of Pesaro e Urbino has an area of 1144 sq. miles. Pop. 233,155.

PESHA'WAR, a town of India, in the n. w. frontier province, capital of division of same name, 12 miles east of the eastern extremity of the Khyber Pass. The division or commissionership comprises the districts of Peshawar (area, 2444 sq. miles; pop. 786,406), Hazara, and Kohat, with the control of part of the hill tribes inhabiting the Khyber Pass. Area, 8206 sq. miles; pop. 1,715,248.

PESO, a silver coin and money of account used in Mexico and other parts of

Spanish America, and often considered equivalent to a dollar.

PESSIMISM, a modern term to denote the opinion or doctrine that maintains the most unfavorable view of everything in nature, and that the present state of things only tends to evil; that in human existence there is an enormous surplus of pain over pleasure, and that humanity can find real good only by abnegation and self-sacrifice. It is antithetical to optimism, and as a speculative theory is the work of Schopenhauer and Von Hartmann, though it is precluded in the metaphysics of Brahmanism and the philosophy of Buddhism.

PESTALOZZI, Johann Heinrich, a Swiss philanthropist and educational reformer, born 1746, died 1827. His novel *Lienhardt* and *Gertrud* (1781–89, 4 vols.) exerted a powerful moral influence, while his educational treatises have laid the foundation for the more rational system of elementary instruction which now obtains in America. The grand principle that lay at the basis of Pestalozzi's method was that of communicating all instruction by direct appeal to the senses and the understanding, and forming the child by constantly calling all his powers into exercise, instead of making him a mere passive recipient, selecting the subjects of study in such a way that each step should best aid the further progress of the pupil.

PESTH, or **PEST**. See Budapest.

PESTILENCE. See Plague.

PETAL, an appellation given to the leaves of the corolla of plants, in opposition to those of the calyx, called sepals.

PET'ALITE, a rare mineral, a silicate of aluminium and lithium, containing from 5 to 6 per cent of the latter. It occurs in masses of foliated structure; color white, occasionally tinged with red, green, or blue.

PETARD, a bell-shaped machine of gun-metal, loaded with powder, attached to an object and exploded: formerly used to break down gates, bridges, barriers, etc.

PETER the apostle, commonly called Saint Peter, was a Galilean fisherman from Bethsaida, originally named Simon the son of Jona, and brother of St. Andrew, who conducted him to Christ. Jesus greeted Simon with the significant words, "Thou art Simon the son of Jona; thou shalt be called Cephas" (in Greek *Petrus*, a stone, whence the name Peter). After the miraculous draught of fishes Peter became a regular and intimate disciple of our Lord. The impetuosity of his character led Peter, especially in the early days of his apostleship, to commit many faults which drew upon him the rebuke of his divine Master. His zeal and eloquence made him often the speaker in behalf of his fellow-apostles on important occasions, and his opinions had great influence in the Christian churches. On one memorable occasion he incurred the rebuke of the apostle Paul in consequence of his behavior toward the Gentile Christians in regard to social intercourse. Nothing certain is known of his subsequent life, but it is almost beyond doubt that he was a joint-founder of the church at Rome, and that he suffered martyrdom there, most likely under Nero, about 64 A.D. The

only written documents left by Peter are his two Epistles. The genuineness of the First Epistle is placed beyond all reasonable doubt, both the external and internal evidence being of the strongest description; that of the Second, however has been disputed by numerous critics on what appears to be plausible grounds. Doubts of its genuineness already existed in the time of Eusebius, and it was not admitted into the New Testament canon till 393 A.D.

PETER the cruel, King of Castile and Leon, born 1334, succeeded his father Alfonso XI. 1350, and died 1369. His reign was one long series of cruelties and despotic acts.

PETER the hermit, an enthusiastic monk of Amiens, whose preaching, after a pilgrimage to Jerusalem (end of the 11th century), gave rise to the first Crusade. (See *Crusades*.) Peter led the way through Hungary at the head of an undisciplined multitude of more than 30,000 men, a comparatively small number of whom survived to reach their destination, and distinguished himself by his personal courage at the storming of the holy city. On his return to his native country he founded the abbey of Noirmoutier, and died its first superior in 1115.

PETER I. (The Great), Alexeievitch, Emperor of Russia, born 1672, was the eldest son by his second wife of the Czar Alexis Mikhailovitch. His elder brothers Fedor and Ivan, were feeble in constitution. Fedor succeeded his father in 1676, and died in 1682. Ivan renounced the crown, and Peter was declared czar, with his mother, the Czarina Natalia Kirilovna, as regent. Sophia, third daughter of Alexis, ambitious to govern



Peter the Great.

succeeded in having Ivan proclaimed czar jointly with Peter, and herself regent. Peter was relegated to private life, his education purposely neglected, and his bad habits encouraged. In 1689 he wrested the power from his sister, and confined her in a convent. Peter was now virtually sole emperor, though, till the death of his brother in 1697, he associated his name with his own in the ukases of the empire. He now determined to do what he could to raise his country out of its barbarism, and to place its people in the ranks of civilized nations. His journey to Holland and England (1697–98), when he practically worked in shipyards, is familiar; and the knowledge he

there gained was amply profited by on his return. Peter, however, not only created a navy, but gave Russia, a sea-board and sea-ports by wresting the Baltic provinces from Charles XII. of Sweden. Young Russian nobles were obliged to travel; schools of navigation and mathematics were founded; agriculture was improved by the introduction of implements, seeds, and superior breeds of cattle. Peter imported foreign artisans of all kinds, established manufactories of arms, tools, and fabrics, and distributed metallurgists through the mining districts of Russia; roads and canals were made to foster internal commerce, and to extend trade with Asia. In 1703 he laid the foundation of St. Petersburg, and twenty years later of its Academy of Sciences. Laws and institutions which in any way interfered with his projects, he either abolished or altered. In his zeal to do good he was too frequently injudicious in choosing times and seasons, and the least show of opposition irritated him into ferocity. He repudiated his wife a few years after marriage for her reactionary leanings; for the same reason his son Alexis was ill treated, compelled to renounce the succession, and condemned to death, but died suddenly before sentence could be carried out. Peter died 28th January, 1725, the immediate cause being inflammation, contracted while assisting in the rescue of some soldiers in Lake Ladoga. In 1707 he had married his mistress Catharine; this marriage was publicly celebrated in 1712; Catharine was crowned in 1724, and succeeded Peter after his death. See Catharine I.

PETER'S, Saint, the Cathedral of Rome, the largest and one of the most magnificent churches in Christendom. It is a cruciform building in the Italian style, surmounted by a lofty dome, built on the legendary site of St. Peter's Martyrdom. In 306 Constantine the Great erected on this spot a basilica of great magnificence. In the time of Nicholas V. it threatened to fall into ruins, and he determined on its reconstruction, but the work of restoration proceeded slowly, and Julius II. (1503-13) decided on the erection of an entirely new building. He laid the foundation-stone of the new cathedral on the 18th of April, 1506, and selected the famous Bramante as his architect. After the latter's death various architects had charge of the work until Michael Angelo was appointed in 1546. He nearly completed the dome and a large portion of the building before his decease (1564). The nave was finished in 1612, the façade and portico in 1614, and the church was dedicated by Urban VIII. on 18th November, 1626. The extensive colonnade which surrounds the piazza and forms a magnificent approach to the church was begun by Bernini in 1667, and the sacristy erected by Carlo Marchionni in 1780. The interior diameter of the dome is 139 feet, the exterior diameter 195½ feet; its height from the pavement to the base of the lantern 405 feet, to the top of the cross outside 448 feet. The length of the cathedral within the walls is 613½ feet; the height of the nave near the door 152½ feet; the width 87½ feet. The width of the side aisles is

33½ feet; the entire width of nave and side aisles, including the piers that separate them, 197½ feet. The height of the baldacchino is 94½ feet. The circumference of the piers which support the dome is 253 feet. The floor of the cathedral covers nearly 5 acres, and its cost is estimated to have exceeded \$50,000,000.

PETERSBURG, a city and river port, Dinwiddie co., Virginia, on the Appomattox river, 23 miles s. of Richmond. It is an important railway center, and a place of considerable trade and manufacturing industry. It was besieged by the Federal forces under General Grant in 1864-65, and the capture of this town, "the last citadel of the confederacy," was soon followed by the surrender of General Lee and the end of the war. Pop. 25,355.

PETERSBURG, St., the capital and most populous town of the Russian empire, is built at the mouth of the Neva, a considerable part being on the south or left bank of the river; a small

while superintending the construction of St. Petersburg is still preserved. Other buildings of importance are: The Admiralty, a vast parallelogram of brick, with a naval and natural history museum and library; the arsenal, containing a museum of artillery; the palaces of the general staff and of the senate; the custom-house, the exchange, and imperial bank; the fortress of Petropavlovsk (the Russian bastille) the academy of sciences, with extensive museum and library; and the imperial library, with over a million volumes and large collections of manuscripts and engravings. There are numerous hospitals and charitable institutions, a university, founded in 1819, many special academies and four theaters maintained by the state. Of the monuments the colossal equestrian statue of Peter the Great, erected by Catharine II. (1782), and the monolithic Doric column of granite, 80 feet high, erected by Nicholas to the memory of Alexander I., take first rank; but these, in common with many of the



St. Petersburg—St. Isaac's cathedral and the senate-house.

portion on the north bank; and the remainder on the numerous islands formed by the different river mouths, these various sections being connected by numerous bridges. The site is low and marshy, and liable to periodic inundations; it is also unhealthy, the death-rate largely exceeding the birth rate. The streets are long, wide, and regular, and there are some immense squares; the public buildings are numerous, magnificent, and of colossal proportions; the quays massive and of granite. Among the many palaces are the Winter Palace, now used only for ceremonial purposes, one of the largest and most luxurious in Europe; the Marble Palace so called; the Michael Palace, now used as the School of Military Engineers; and the Hermitage Palace, containing a fine library and one of the richest collections of French, Flemish, Dutch, Italian, Spanish, Russian, and other paintings, the private property of the czars, besides engravings, coins, gems, antiquities, etc. The cottage in which Peter the Great lived

finest buildings have severely suffered from climatic influences. St. Petersburg commands a large share of the commerce of the whole empire, but exact statistics are not obtainable. Formerly the port of the capital was at the strongly fortified island town of Cronstadt (which see), but large vessels now reach St. Petersburg by means of a deep canal, and commodious harbors have been constructed here. The manufactures are varied, but the principal are glass-works, tanneries, sugar-refineries, cotton mills, breweries, and tobacco works; also several government establishments besides those connected with military and naval equipment, as a carpet manufactory, modeled on that of the Gobclins at Paris, and a glass and porcelain manufactory. St. Petersburg was founded by Peter the Great in 1703, when he had just wrested its site from the Swedes. The forced construction of a city in a site apparently forbidden by nature cost the lives, according to various accounts, of from 100,000 to 200,000 peasants, collected from all

parts of the Russian empire. It was at first built entirely of wood, and without a proper street system, but the extensive fires of 1736 and 1737 facilitated the reconstruction on an improved plan. The Empress Elizabeth did much to improve the city; it is, however, chiefly indebted to Catharine II. for its regularity and architectural splendor; and the improvements under Nicholas and Alexander II. have made it one of the finest of European capitals. Pop. 1,267,023.

PETER'S PENCE, a papal tribute collected in several of the western countries of Europe. The idea of an annual tribute seems to have originated in England before the Norman conquest, and was exacted from every householder about St. Peter's Day for the support of an English college or hospice in Rome. It was finally abolished by Elizabeth. This contribution was sometimes also called Romescot. It is still collected among Catholics, especially since the abolition of the pope's temporal power.

PETION DE VILLENEUVE (pā-ti-on dē vėl-neuv), Jérôme, French revolutionary, was born in 1753, was chosen deputy, by the tiersétat of that city, to the states-general in 1789. In October he was made a member of the Committee of Public Safety; elected president of the National Assembly in 1790; appointed president of the criminal tribunal of Paris, and became mayor of Paris in 1791. After the death of the king he was nominated a deputy to the convention; joined the Girondists; was impeached by Robespierre; escaped from prison, and died, it is supposed, from hunger, his body, in 1794, being found in a field in the department of the Gironde half devoured by wolves.

PETITION OF RIGHT, in English history, a parliamentary declaration of the rights and liberties of the people, assented to by Charles I. in the beginning of his reign (1628), and considered a constitutional document second in importance only to Magna Charta. The petition demanded: (1) that no freeman should be forced to pay any tax, loan, or benevolence, unless in accordance with an act of parliament; (2) that no freeman should be imprisoned contrary to the laws of the land; (3) that soldiers and sailors should not be billeted on private persons; (4) commissions to punish soldiers and sailors by martial law should be abolished.

PETIT JURY. See Jury.

PETOFI (pe-teu'fē), Sander, a Hungarian poet, born in 1823. His lyric of *Most vagy sohā* (Now or Never) became the war-song (1848) of the revolution; and in recognition of his lyrical fervency he has been named "the Hungarian Burns." In the revolutionary war he was appointed an adjutant under Bem, and was killed in the battle of Schässburg (1849).

PETRARCH (pet'rārċ), Francesco Petrarca, an Italian poet and scholar, born at Arezzo 20th July, 1304. It was at Avignon in 1327 that he first saw, in the church of St. Claire, the Laura who exercised so great an influence on his life and lyrics. Our information regarding this lady is exceedingly meagre, but it is supposed that her name was Laura

de Noves, that she had become the wife of Hughes de Sade two years before she was seen by Petrarch, and that she died in 1348 a virtuous wife and the mother of a large family. After this first meeting Petrarch remained at Avignon three years, singing his purely Platonic love, and haunting Laura at church and in her walks. He then left Avignon for Lombez (French department of Gers), where he held a canonry gifted by Pope Benedict XII., and afterward visited Paris, Brabant, Ghent, the Rhine, etc. In 1337 he returned to Avignon, bought a small estate at Vacluse, in order to be near Laura, and here for three years wrote numerous sonnets in her praise.



Francesco Petrarca.

His Latin works were highly esteemed, and in 1341 he was called to Rome to receive the laureate crown awarded for his Latin poem of *Africa*, an epic on the Punic wars. At Parma he learned the death of Laura, which he recorded on his copy of Virgil, and celebrated in his *Triumphs*. A large part of his time was employed in various diplomatic missions, and in 1370 he took up his residence at Arquà, near Padua, where he passed his remaining years in religious exercises, dying 18th July, 1374. Among his Latin works are three books of *Epistles* (*Epistolæ Familiæres*) and twelve *Eclogues*, his poem *Africa*, various philosophical, religious, political, and historical treatises; his Italian poems, on which his fame now entirely rests, chiefly consist of *Sonetti* and *Canzoni* in *Vita e in Morte di Laura*, and of *Trionfi* (*Triumphs*), a series of allegorical visions. His poems had an important influence on the development of Italian and modern European poetry.

PETREL, the common name of the



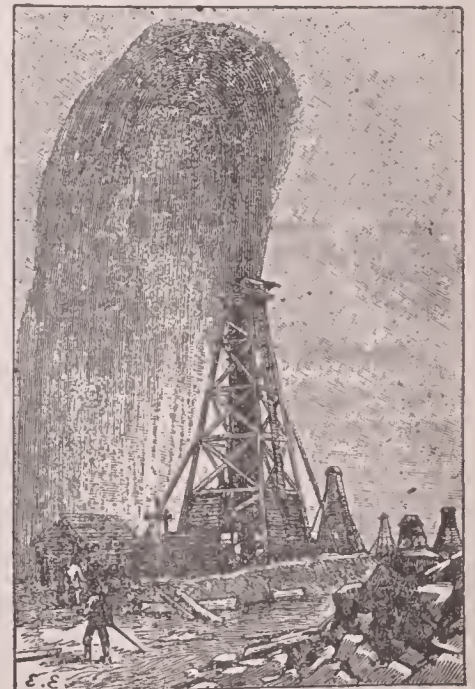
Stormy petrel.

web-footed oceanic birds of the family

Procellariidæ. The petrels are nocturnal in their habits, breed in holes in the rocks, lay but one egg, and are almost all of small size and more or less somber plumage. The smaller species are well known to sailors under the name of Mother Carey's chickens, and their appearance is supposed to presage a storm. The term stormy petrel is more exclusively applied to a bird which seems to run in a remarkable manner along the surface of the sea, where it picks up its food.

PETRIFICATIONS are the organic bodies (animal or vegetable) which have, by slow process, been converted into stone. The term is used in much the same sense as fossils.

PETROLEUM, a variety of naphtha, called also rock or mineral oil, a liquid inflammable substance in certain localities exuding from the earth, in some places collected on the surface of the water in wells, in other places obtained in great quantities by boring. It is essentially composed of a great number of hydrocarbons; is unctuous to the touch; exhales a strong odor; flows chiefly from beds associated with coal strata; and is found in enormous quantities in various parts of the United States, Russia (especially at Baku on the Caspian), Canada, Burmah, etc. At Baku a single well is said sometimes to spout as much as 11,000 tons of oil in a single day, the oil rising perhaps to the height of 300 feet. It yields kerosene, paraffin, and paraffin oil, so extensively employed for illuminating



Outburst of petroleum in well.

purposes; also lubricating oil and vaseline; and has been largely employed as liquid fuel in factories, locomotives, and steamships. Steamers, specially constructed with tanks, are now engaged in its transport, and in the larger towns in England vast reservoir-tanks for its reception have been recently constructed. Attention was first strongly drawn to petroleum by the successful manufacture and sale of paraffin oil in

Britain. This industry was also started in America, but it soon came to an end after 1859, when a company "struck oil" by boring at Oil Creek, Pennsylvania, and obtained a supply of 400 gallons a day. This led to numerous other borings, and the oil was obtained in such quantities that towns of considerable size soon sprang up in the oil district, railways were constructed, immense reservoirs were made, and long lines of oil pipes laid down, while large fortunes were realized. At first the borings were not very deep, and the oil generally flowed naturally; subsequently deeper borings were necessary, and the oil could only be raised to the surface by pumping. Boring for oil is carried on in the same way as for water. See Artesian Wells, Boring.

PEWTER, an alloy of tin and lead, or of tin with proportions of lead, zinc, bismuth, antimony, or copper, and used for domestic utensils. One of the finest sorts of pewter is composed of 83 parts of tin to 17 parts of antimony, while the common pewter of which beer-mugs and other vessels are made consists of 4 parts of tin and 1 of lead. The kind of pewter of which tea-pots are made (called Britannia-metal) is an alloy of tin, brass, antimony, and bismuth.

PFENNIG, a small copper or rather bronze coin current in Germany, of which 100 = 1 mark; so that ten pfennige are worth a little over two cents.

PHACOCHERE (fā'ko-kēr), Phacochære, the wart-hog of Africa, apachydermatous mammal, akin to the swine, characterized by a large wart-like excrescence on each side of the face. The



Wart-hog.

tusks of the male project 8 or 9 inches beyond the lips, and form terrible weapons. One species is the Abyssinian phacochære or Ethiopian wild-boar.

PHA'COPS, a genus of fossil trilobites. *P. latifrons* is characteristic of the Devonian formation, and is all but world-wide in its distribution.

PHÆDO, a Greek philosopher, a scholar of Socrates, and founder of a school of philosophy in Elis. The dialogue of Plato on the immortality of the soul, which contains the conversation of Socrates in prison before his death, bears the name of Phædo. None of his own writings are extant.

PHÆDRA, in Greek mythology, daughter of Minos, king of Crete, was the sister of Ariadne and wife of Theseus. She falsely accused her stepson, Hippolytus, of a criminal attempt upon her honor, an injustice of which she afterward repented, and was either killed by

her husband or committed suicide. Sophocles and Euripides made this the subject of tragedies (both of which are lost), and their example was followed by Racine.

PHA'ETHON, a mythological character, who one day obtained leave from his father Helios (the Sun) to drive the chariot of the sun, but being unable to restrain the horses Zeus struck him with a thunderbolt and hurled him headlong into the river Po. The name in its English form of Phaëton is applied to an open four-wheeled carriage.

PHAL'ANGER, the name given to marsupial quadrupeds inhabiting Australasia. They are generally of the size of a cat, are nocturnal in their habits,



Vulpine phalanger.

and live in trees, feeding on insects, fruits, leaves, etc. The sooty phalanger or tapoa, so called from its color, is pretty common in Tasmania. The vulpine phalanger or vulpine opossum is another species, common in Australia.

PHALAN'GES (-jēz), the name applied to the separate bones of which the digits (or fingers and toes) of vertebrates are composed. Each digit or finger of the human hand consists of three phalanges, with the exception of the pollex or thumb, which is composed of two only.

PHAL'ANX, a name given generally by the Greeks to the whole of the heavy-armed infantry of an army, but more specifically to each of the grand divisions of that class of troops when formed in ranks and files close and deep, with their shields joined and their pikes crossing each other. The Spartan phalanx was commonly 8 feet deep, while the Theban phalanx was much deeper.

PHAL'ARIS, a small genus of grasses, of which the seed of one of the species, canary-grass, is extensively employed as food for birds, and commonly known as canary-seed.

PHALLUS, the emblem of the generative power in nature, carried in solemn procession in the Bacchic orgies of ancient Greece, and also an object of veneration or worship among various Oriental nations. In botany, Phallus is a genus of fungi.

PHANEROGA'MIA, a primary division of the vegetable kingdom, comprising those plants which have their organs of reproduction (stamens and pistils) developed and distinctly apparent.

PHANTASMOGA'RIA, a term applied to the effects produced by a magic-lantern.

PHARAOH (fā'rō), the name given in the Bible to the kings of Egypt, corresponding to the p-ra or ph-ra of the Egyptian hieroglyphics, which signifies the sun. The identification of the Pharaohs mentioned in Scripture with

the respective Egyptian kings, particularly the earlier ones, is a matter of great difficulty.

PHARISEES, a religious sect among the Jews which had risen into great influence at the time of Christ, and played a prominent part in the events recorded in the New Testament. The most probable account of the origin of the Pharisees as a distinct sect is that which refers it to the reaction against the attempt of Antiochus Epiphanes to break down the distinctions between his Jewish and his Greek subjects. At the time of Christ the Pharisees stood as the national party in politics and religion—the opponents of the Sadducees. The fundamental principle of the Pharisees was that of the existence of an oral law to complete and explain the written law. "Moses," says the Mishna, "received the law (the unwritten law is meant) from Sinai, and delivered it to Joshua, and Joshua to the elders, and the elders to the prophets, and the prophets to the men of the Great Synagogue." This oral law declared the continuance of life after the death of the body, and the resurrection of the dead. This authoritative tradition received in process of time additions which were not pretended to be derived directly from Moses:—1st. Decisions of the Great Synagogue by a majority of votes on disputed points. 2d. Decrees made by prophets and wise men in different ages. 3rd. Legal decisions of proper ecclesiastical authorities on disputed questions. These authorities comprehended both the writers of the sacred books and their approved commentators. There is no doubt that though their strict observance of small points often led to hypocrisy and self-glorification, the sect contained a body of pious, learned, and patriotic men of progress.

PHARMACOPŒ'IA, a book containing the prescriptions for the preparation of medicines recognized by the general body of practitioners. Up till 1863 separate Pharmacopœias were issued by the Colleges of Physicians of London, Edinburgh, and Dublin. Since then a British Pharmacopœia, issued by the medical council of the kingdom, is recognized by the whole medical profession of Great Britain. There is also an American Pharmacopœia, based on that of Britain.

PHAR'MACY, pharmaceutics, the art of preparing, compounding, and combining substances for medical purposes: the art of the apothecary. As these substances may be mineral, vegetable, or animal, theoretical pharmacy requires a knowledge of botany, zoology, and mineralogy; and as it is necessary to determine their properties, and the laws of their composition and decomposition, of chemistry also. In a narrower sense pharmacy is merely the art of compounding and mixing drugs according to the prescription of the physician.

PHAROS, a lighthouse. The name is derived from the island of Pharos, close to and now part of Alexandria, which protected the port of that city. On the eastern promontory of the island stood the lighthouse of Alexandria, so famous in antiquity, and considered one of the wonders of the world, built 300 years B.C.

PHARYNX (fa'ringks), the term applied to the muscular sac which intervenes between the cavity of the mouth and the narrow œsophagus, with which it is continuous. It is of a funnel shape, and about 4 inches in length; the posterior nostrils open into it above the soft palate, while the larynx, with its lid, the epiglottis, is in front and below. The contraction of the pharynx transmits the food from the mouth to the œsophagus. From it proceed the eustachian tubes to the ears.

PHAS'MIDÆ, specter insects or walking-sticks, remarkable for their very close resemblance to the objects in the midst of which they live, this peculiarity known as mimicry, being their only protection against their enemies. Some of them are destitute of wings and have



Phasmidæ, or specter insects.

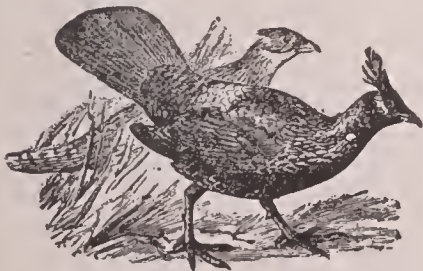
1, Brazilian walking-stick. 2, Australian.

the appearance of dead twigs, while the absence of motion in the insects add to the deception. In others, as the genus *Pythium*, the wings have the appearance of withered leaves, while the brighter hue of the wing-covers of a few of larger size give to the animal the appearance of a fresher leaf.

PHEASANT, the general name given to birds of the family *Phasianidæ*, which comprises several genera besides that of the pheasants proper, *Phasianus*.



Golden pheasant.



Impeyan pheasant.

There are usually naked spaces of skin on the head or cheeks and often combs or wattles. The plumage of the males is brilliant, that of the females more sober,

and the males carry spurs on the tarso-metatarsus. The wings are short, the tail long. The three front toes are united by a membrane up to the first joint, and the hinder toe is articulated to the tarsus. The food consists of grains, soft herbage, roots, and insects. They are chiefly terrestrial in habits, taking short, rapid flights when alarmed. The pheasants are polygamous, the males and females consorting together during the breeding-time, which occurs in spring.

PHELPS, Edward John, American political leader and diplomat, born at Middlebury, Vt., in 1822. In 1851 he was appointed Second Comptroller of the United States treasury. In 1870 he was a member of the Vermont constitutional convention. He was appointed by President Cleveland, Minister to the Court of Saint James's. In 1893 he was appointed senior counsel for the United States in the Bering sea arbitration. He died in 1900.

PHELPS, Elizabeth Stuart. An American author. See Ward, Elizabeth Stuart Phelps.

PHENIC ACID, phenol. See Carbohc Acid.

PHENOM'ENALISM, that system of philosophy which inquires only into the causes of existing phenomena. The sceptical phenomenalism of Hume is now represented by Positivism. A phenomenalist does not believe in an invariable connection between cause and effect, but holds this generally acknowledged relation to be nothing more than an habitually observed sequence.

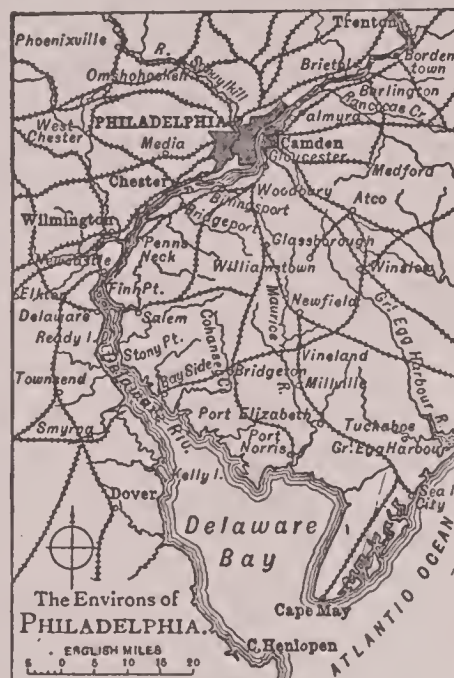
PHI'DIAS of Athens, a celebrated Greek sculptor, who was born about 490 B.C., and flourished in the age of Pericles but of whose life hardly any particulars are known. Among his works were three statues of Athena which were all in the Acropolis of Athens in the time of Pausanias. One colossal statue of Athena was in bronze, and the goddess was represented as a warrior-goddess in the attitude of battle. The second and still more famous stood in the Parthenon, and was made of ivory and gold, representing Athena standing with a spear in one hand and an image of Victory in the other; it measured, with the pedestal, about 41½ feet in height. The third statue, in bronze, of a smaller size, was called emphatically the beautiful, on account of its exquisite proportions. Another colossal statue by Phidias, that of Zeus at Olympia, was ranked for its beauty among the wonders of the world. Zeus was here seen sitting upon a throne, with an olive wreath of gold about his temples; the upper part of his body was naked; a wide mantel, covering the rest of it, hung down in the richest folds to his feet, which rested on a footstool. The naked parts of the statue were of ivory, the dress was of beaten gold. The right hand held a Victory, and the left a scepter tipped with the eagle. The Zeus was removed to Constantinople by Theodosius I., and was destroyed by fire in 475 A.D. During the government of Pericles, which lasted twenty years, Athens was adorned with costly temples, colonnades, and other works of art. Phidias superintended these improvements; and the sculptures with which

the Parthenon, for instance, among other buildings, was adorned, were partly his own work, and partly in the spirit and after the ideas of this great master. Of the merits of these we can ourselves judge. Phidias received great honors from the Athenians, but he is also said to have been falsely accused of peculation, and of impiety for putting his own likeness and that of Pericles on the shield of Athena. He died probably about B.C. 432.

PHILADELPHIA, a city and river port in Pennsylvania, after New York and Chicago the largest city in the Union, 125 miles northeast of Washington and 85 miles southwest of New York, situated between the rivers Delaware and Schuylkill, with suburbs on the opposite sides of both rivers, 96 miles from the Atlantic coast. The site is nearly flat, but slopes gently both toward the Delaware and the Schuylkill. The houses are generally built of brick, the private houses having in many cases dressings of white marble. The streets were originally laid out so as to run nearly due westward from the Delaware, intersected by other streets running nearly north and south, and still almost everywhere the streets cross each other at right angles. Market street, the great central street running east and west, and continuously built upon for over 4 miles, has a width of 100 feet; Broad street, the principal central street running north and south, is built upon to about the same length, and is 113 feet in width. Most of the other chief streets vary from 50 to 66 feet broad, some of the avenues, however, being much wider. At the intersection of some are fine squares. There are more than 1500 miles of streets, 900 miles of which are paved, and there are 951 miles of sewers and over 1300 miles of water mains. The street railways, employing the overhead trolley system, have over 500 miles of track, and the steam railroads over 360 miles. A subway system of four tracks from the Delaware to the Schuylkill, with an elevated extension from the Schuylkill to the city limits is nearly completed. Several fine bridges, both for railway and general traffic, span the Schuylkill, and a regular service of steam-ferries across the Delaware affords communication with the shores of New Jersey. Among the notable public buildings are the state house, containing a large room called Independence Hall, from the circumstance that the declaration of independence was signed here (4th July, 1776); the custom-house, a white marble edifice; the United States mint, a marble-fronted building; the post-office, a large and handsome granite structure with a dome; the new city-hall, a splendid building of granite and marble, completed in 1889, with a tower 450 feet high, surmounted by a statue of William Penn; Girard college, a fine example of the Corinthian style; the buildings of Pennsylvania university; the splendid building accommodating the Academy of Fine Arts. Among the leading office buildings are the Land Title Annex, the Real Estate Trust building, the Arcade building, the Commonwealth Trust building, the Real Estate Title and

Trust Company building, the Drexel building, the Bullitt building, the Provident building. The Pennsylvania railroad station, with a train shed over 700 feet long, and the Reading terminal, a handsome railroad station, approached like that of the Pennsylvania railroad by a viaduct, are notable railway terminals and office headquarters. Of newspaper buildings the most prominent are those of *The North American* (22 stories), *The Record*, and *The Public Ledger*. Philadelphia has many important hotels, among the most elegant and commodious of which may be mentioned the Walton and the new Bellevue-Stratford, both on Broad street near city hall. The structures representing various interests are the Masonic and Odd Fellow's temples, Young Men's Christian Association building, Young Women's Christian Association, the Roman Catholic cathedral, the Kenneth Israel synagogue, the Baptist Temple, Holy Trinity (Protestant Episcopal), the Arch Street (Methodist Episcopal), the First Presbyterian and the Tabernacle Presbyterian and the Friends' Meeting House on Arch street—the Quaker Westminster of America. Of educational institutions the University of Pennsylvania, Drexel institute, the new Boys' High school, Girard college with its early Grecian structures, and the Roman Catholic high school are architecturally of importance. Charitable institutions are numerous and efficient. The educational establishments include the Pennsylvania university; the Jefferson Medical college; University Medical college; the Women's Medical college; the Academy of Fine Arts; the School of Design for Women; the Academy of Natural Sciences; the Franklin institute; numerous colleges, academies, and other educational institutions, supported by the various religious denominations; the Girard college, devoted to the secular education of orphan boys; and the public schools. Many of the above institutions possess extensive and valuable libraries in addition to which are the large collections belonging to the Library company, and to the Mercantile library; and Philadelphia is one of the recognized centers of literary, dramatic, and artistic culture. In addition to the public squares, the chief place of outdoor recreation is Fairmount park, with an area of 2740 acres, possessing much natural beauty, being well-wooded and having a great variety of surface. Many fine monuments have been placed in the park, among them being those of Washington, Lincoln, Garfield, Grant, Schiller Goethe, Columbus and Joan of Arc. The principal places of indoor amusements are the theaters, numerous concert-rooms, etc. The Walnut Street theater is the oldest in the county. The other theaters are: Keith's New theater, the Garrick, the South Broad, the Chestnut Street, the Grand, and the Academy of Music. Philadelphia ranks high as a center of foreign, inland, and coasting trade. The leading articles of export are grain, provisions, petroleum, anthracite, and gas-coal, iron and ironwares, lumber, tobacco, and cotton (raw and manufactured). The principal imports

consist of cotton, woolen, and flax goods, tinplate, iron and iron-ore, chemicals, etc. Philadelphia is a great manufacturing city, ranking third in the value of products, the carpet industry being the largest in the country. The other leading manufactures are iron and steel, machinery and tools, refined sugar, clothing, boots and shoes, brewery products, chemicals, household furniture, etc.—Philadelphia was founded and named by William Penn in 1682 as the



capital of his colony of Pennsylvania. For a long time it was almost exclusively occupied and controlled by Quakers. Many of its most important improvements were due to Benjamin Franklin, and it played a most prominent part during the revolutionary war. In May-November, 1876 (a hundred years after the issue of the declaration of independence), a centennial exhibition was held on the grounds at the southwest extremity of Fairmount park. Pop. 1909 estimated at 1,500,000.

PHILEMON, Epistle of Paul to, one of the books of the New Testament. This epistle, according to the prevalent opinion, was, together with the Epistles to the Ephesians, Colossians, and Philipians, written from Rome during St. Paul's first imprisonment in that city. The only doubt thrown on this opinion by those who accept the genuineness of the epistles is contained in the suggestion supported by Meyer and others, that these epistles were written during the apostle's imprisonment at Cæsarea. The genuineness and authenticity of Philemon is questioned by very few critics.

PHILIP, one of the twelve apostles, according to John's gospel "of Bethsaida, the city of Andrew and Peter," and who was called to follow Jesus at Bethany. After the resurrection he was present at the election of Matthias to the apostleship, but is not again mentioned. In the Western church he is commemorated on 1st May.—Philip the Evangelist, often confounded with the above, is first mentioned in Acts

vi. 5. He preached at Smyrna, where Simon Magus was one of his converts; baptised the Ethiopian eunuch; entertained Paul and his companion on their way to Jerusalem, when "he had four daughters which did prophesy."

PHILIP II., King of Macedon, the most famous of the five Macedonian kings of this name, was born B.C. 382, and succeeded his elder brother Perdiccas in 360. His ambition was to make himself in the first place, supreme in Greece, and to accomplish this he began by seizing the Greek towns on his borders: Amphipolis, which gave him access to the gold-mines of Mount Pangæus, Potidæa, Olynthus, etc. The "sacred war" carried on by the Amphictyonic council against the Phocians gave Philip his first opportunity for interfering directly in the affairs of Greece. After the capture of Methone—the last possession of the Athenians on the Macedonian coast—between 354 and 352, Philip made himself master of Thessaly, and endeavored to force the pass of Thermopylæ, but was repulsed by the Athenians. The terror of his name provoked the "Philipics" of Demosthenes, who endeavored to rouse the people of Athens to form a general league of the Greeks against him; but by 346 he was master of the Phocian cities and of the pass of Thermopylæ, and as general to the Amphictyonic council he was the crowned protector of the Grecian faith. Demosthenes exerted all his eloquence and statesmanship to raise the ancient spirit of Grecian independence, and a powerful army was soon in the field, but being without able or patriotic commanders it was defeated at the decisive battle of Chæroneia in August, 338 B.C. After this last struggle for freedom Philip was acknowledged chief of the whole Hellenic world, and at a congress held at Corinth he was appointed commander of the Greek forces, and was to organize an expedition against Persia. While preparing for this enterprise he was murdered in 336 B.C., some say at the instigation of his wife Olympias.

PHILIP I., King of France, was born 1052, and succeeded to the throne under the guardianship of Baldwin V., count of Flanders, in 1060. He died in 1108.

PHILIP II., Augustus, King of France, born 1165, was crowned as successor during the lifetime of his father Louis VII., whom he succeeded in 1180. In 1190 he embarked at Genoa on a crusade to the Holy Land, where he met Richard Cœur de Lion, who was engaged in the same cause in Sicily. The jealousies and disputes which divided the two kings induced Philip to return home the next year. He invaded Normandy during Richard's captivity (1193), confiscated the possessions of King John in France after the death of Prince Arthur (1203), prepared to invade England at the instance of the pope (1213), turned his arms against Flanders and gained the celebrated battle of Bouvines (1214). He died in 1223.

PHILIP III., called the Hardy, King of France, was the son of Louis IX. and Margaret of Provence. He was born 1245, and succeeded his father 1270. The invasion of Sicily by Peter of Ara-

gon, and the massacre of the French, known as "the Sicilian vespers," caused him to make war against that prince, in the course of which he died, 1285.

PHILIP IV. (Le Bel), King of France was born in 1268, and succeeded his father in 1285. He had already married Joanna, queen of Navarre, by which alliance he added Champagne as well as Navarre to the royal domain, which he made it his policy still further to increase at the expense of the great vassals. He even attempted to take Guienne from Edward I. of England, but afterward entered into an alliance with that monarch, and gave him his daughter in marriage (1299), from which originated the claim of Edward III. on the crown of France. Philip left numerous ordinances for the administration of the kingdom, which mark the decline of feudalism and the growth of the royal power. He also convoked and consulted the states-general for the first time. He died in 1314.

PHILIP VI. of Valois, King of France, was the nephew of Philip IV., to whose last son, Charles IV., he succeeded in virtue of the Salique law. He was born in 1293, and succeeded to the crown in 1328. In his reign occurred the wars with Edward III. of England, who claimed the French crown as grandson, by his mother, of Philip IV. (see above article). Philip died in 1350.

PHILIP II. of Spain, was the son of Charles V. and Isabella of Portugal, and was born at Valladolid in 1527. He was married in succession to the Princess Mary of Portugal 1543, and to Mary of England in 1554, the same year in which he became king of Naples and Sicily by the abdication of his father. In 1555 his father resolved to abdicate the sovereignty of the Netherlands in Philip's favor. This was done in public assembly at Brussels on 25th October, 1555; and on 16th January, 1556, in the same hall he received, in presence of the Spanish



Philip II. of Spain.

grandees then in the Netherlands, the crown of Spain, with its possessions in Asia, Africa, and America. The cause of religion in France was a constant subject of solicitude with Philip. In Naples, as in Spain, his zeal led him to persecute the Protestants; but it was in the Netherlands that his bigotry and obstinacy had their most disastrous, though ultimately fortunate results. In 1566 the revolt of the Netherlands commenced, which ended in the separation of the seven northern provinces from

the crown of Spain, and their formation into the Dutch Republic. In 1571 the Archduchess Anne of Austria became his fourth wife, and the same year his natural brother, Don John of Austria, obtained the great naval victory of Lepanto over the Turks. In 1580 his troops under Alva subdued Portugal, of which, and all its dependencies, Philip now became sovereign. In 1586 Philip declared war with England. The year 1588 saw the destruction of the Armada and the descent of Spain from her position as a first-class power in Europe. The remainder of his reign was occupied with war and intrigues with France, but in 1598 the Peace of Vervins was concluded. He died in 1598.

PHILIP V. of Spain, the first Spanish king of the Bourbon dynasty, was born at Versailles 1683, died 1746. He was the grandson of Louis XIV. of France, and succeeded to the crown of Spain by the will of Charles II., who died without direct heirs, as the grandson of Charles' elder sister. On the death of Charles in November, 1700, he was immediately proclaimed king, and was generally recognized in Spain, Naples, and the Netherlands; but the succession was contested by the Archduke Charles of Austria, whose claim was enforced by the armies of England, Holland, and Austria in the wars of the Spanish succession which began in 1702. By the Treaty of Utrecht (1713) he was recognized as King of Spain, but Gibraltar was lost to Spain, Minorca was also ceded to England, Sicily to Savoy, the Netherlands, Naples, and the Milanese to Austria. In 1724 Philip resigned the crown of Spain in favor of his son Don Louis, but the death of Louis a few months later induced him to resume the royal power. He died in 1746, after a reign of forty-six years.

PHILIP the bold, Duke of Burgundy, born in 1342, was the fourth son of John, king of France. He fought at Poitiers (1356), where, according to Froissart, he acquired the surname of the Bold. He shared his father's captivity in England, and on his return his father, whose favorite he was, made him Duke of Touraine, gave him the Duchy of Burgundy, and made him premier peer of France. He was one of the most powerful French princes during the minority of Charles VI., during whose insanity he acted as regent, retaining the regency till his death in 1404.

PHILIP I. (The Magnanimous), Landgrave of Hesse, born in 1504. He began to reign at the age of fourteen, and introduced the Lutheran religion into Hesse in 1526. In 1527 he founded the University of Marburg, subscribed the protestation to the Diet of Spire in 1529, submitted the Confession of Faith at Augsburg in 1530, and in 1531 formed with the Protestant princes the Schmalkalden League. He was forced to submit to the Emperor Charles V. in 1547, who kept him a prisoner for five years. After his return to his dominions he sent a body of auxiliaries to assist the French Huguenots. He died in 1567.

PHILIP'PI, a city of Macedonia, now in ruins, founded by Philip of Macedon about B.C. 356. The two battles fought in B.C. 42, which resulted in the over-

throw of Brutus and Cassius by Antony and Octavius, were fought here. Philippi was visited on several occasions by the apostle Paul, who addressed to the church there one of his epistles.

PHILIP'PIANS, Epistle to the, one of St. Paul's epistles, is supposed to have been written from Rome toward the close of his first imprisonment there, about A.D. 63. Some authorities suppose it to have been written in Cæsarea. The genuineness of this epistle has been little questioned. It is referred to, though not quoted, in the epistle of Polycarp and by Tertullian and other early fathers. Epaphroditus, who conveyed it, was the messenger of the Philippians to Paul, and had been ill at Rome, which had been a cause of anxiety to the Philippians. Paul, therefore, hastened his return, and sent this epistle by him.

PHILIP'PICS, the name given to three celebrated orations of the Greek orator Demosthenes against Philip, king of Macedon (351-341 B.C.). This name was also applied to Cicero's fourteen speeches against Antony, and it has hence come to signify an invective in general.

PHILIP'PINES, or **PHILIPPINE ISLANDS**, an archipelago belonging to the United States, in the Pacific ocean, n.e. of Borneo, having on the west the China sea, on the east the North Pacific, and on the south the Sea of Celebes; area, 114,360 sq. miles; pop. about 7,000,000. It consists of about 1200 large and small islands. Of the former the chief are Luzon, Mindoro, Samar, Panay, Leyte, Cebu, Negros, Bohol, Mindanao, and Palawan. Luzon is the only island of great commercial importance. It contains the capital Manila. The shore lines and internal surface of the larger islands are extremely rugged and irregular. Their magnificent mountain ranges are clothed with a gigantic and ever-teeming vegetation; and between these lie extensive slopes and plains of the richest tropical fertility, watered by numerous lakes and rivers, which afford abundant means of irrigation and transport. The climate on the whole is healthy, but hurricanes are common. Earthquakes are frequent, and often very destructive. The principal agricultural product is rice, and next in importance are sugar-cane, tobacco, and coffee. Fibrous plants are also abundant, and among the chief of these are the well-known Manila-hemp, the cotton-plant, the gomuti palm, ramie, etc. The pine-apple is grown both for its fiber and its fruit. The textile productions of the Philippines, the work of the native population, are considerable in number, ranging from the delicate and costly pina muslins, made from the pine-apple fibre, to coarse cottons, sacking, and the mats made of Manila-hemp and the fiber of the gomuti palm. The islands are rich in minerals, including gold, iron, quicksilver, sulphur, coal, marble, petroleum, etc., but they are little worked. The foreign trade is mostly in the hands of British and American mercantile houses, and consists principally in the export of sugar, tobacco, Manila-hemp, indigo, coffee, birds'-nests, trepang, sapan-wood, dye-woods, hides, rattans, mother-of-pearl, gold-

dust, etc., and in importing rice and other food-stuffs, and various manufactured articles. The natives are of diverse origin. Wild tribes, some of which are extremely ferocious, still haunt the mountains. The chief mountain tribes are the Negritos, diminutive negroes, who have given their name to the island Negros, though not confined to it; and the *Ætas* or *Itus*, a dusty or copper-colored race. But the great mass of the population consist of the Tagals, inhabiting Luzon, and the Bisayans, who inhabit the other islands. These speak respectively the Tagal and Bisayan tongues, each of which has a variety of dialects. Half-castes, Indo-European and Indo-Chinese, engross much of the business and wealth of the islands. Spaniards are comparatively few. The independent tribes are partly Mohammedan and partly heathen. Most of the former subjects of Spain profess Roman Catholicism, and priests are very numerous. The largest town and chief seaport as well as the seat of government is Manila. The Philippines were discovered by Magellan in 1520-21, and were finally annexed to the Spanish dominions, and named after Philip II. In 1762 Manila was taken and for a short time held by a British fleet, and the Americans seized it in 1898. The islands were ceded by Spain to the United States in 1898.

In February, 1900, the provisional government of the islands was intrusted to a new board of civil commissioners, five in number, at the head of which was Judge William H. Taft of Ohio. The commission in January, 1901, established a municipal code for the government of cities other than Manila and tribal settlements. A constitution for the government of the provinces enacted by the commission provided that their officials should be a governor elected by the municipalities subject to the approval of the commission, and a secretary, a treasurer, a commissioner of public works, and a public prosecutor, all appointed by the commission. From time to time the commission instituted civil governments in the localities as circumstances required, until in 1903 more than 700 localities had local governments suited to their conditions. By an act of the commission dated June 11, 1901, the judicial system was reorganized. A supreme court was created to consist of seven justices, four American and three native; and sixteen courts of First Instance, over which natives presided, were established. The city of Manila, the capital, is governed by a board of three commissioners. In addition to the above measures the present constitution of government for the Philippines consists of the Philippine commission, the governor and vice-governor, the departments of the interior, of commerce and police, of finance and justice, and of public instruction.

The first Filipino assembly elected by the people was opened on October 15, 1907, on which occasion Secretary of War Taft made an address in which he expressed the exact truth of the situation as seen by the authorities at Washington.

PHILIPPINE WAR, 1899-1900, CHRONOLOGY OF

Hostilities began	February 4, 1899
Battles around Manila	February 4-7, 1899
Battle at Pasig	March 13, 1899
Battle at Malinea	March 26, 1899
Battle at Santa Cruz	April 10, 1899
Santa Cruz captured	April 25, 1899
San Fernando captured	May 5, 1899
Battle at Bacoar	June 13, 1899
Battle at Imus	June 16, 1899
Battle at Colamba	July 26, 1899
Battle at Calulut	August 9, 1899
Battle at Angeles	August 16, 1899
Major John A. Logan killed	November 14, 1899
General Gregorio del Pilar killed	December 10, 1899
General Lawton killed	December 19, 1899
Taft commission appointed	February 25, 1900
Amnesty proclaimed	June 21, 1900
Aguineldo captured	March 23, 1901
Civil government party established	July 4, 1901

PHILISTINES, the name of a Semitic people or race who inhabited the southern part of the lowlands of Palestine, from the coast near Joppa to the Egyptian desert south of Gaza. They occupied five chief cities (Ashdod, Gaza, Gath, Askelon, Ekron), and these formed a kind of confederacy under five lords or chiefs. Mention is made of this people in Genesis xxi., xxvi., but it was during the time of the Judges in Israel, and subsequently in the reigns of Saul and David, that the Philistines attained their highest power, and from the latter received their greatest defeats. In the wars between Assyria and Egypt the country of Philistia was subdued by Tiglath-Pileser (734 B.C.); but the Philistines still intrigued with Egypt, and made various revolts against Sargon and Sennacherib to assert their independence. During the Babylonian captivity they avenged themselves on



Philistine prisoners.—Sculptures at Medinet Haboo.

their old enemies the Israelites (Ezekiel xxv. 15), but subsequently the two nations seem (Nehemiah xiii. 23), to some extent, to have fraternized. The origin of this race has been a question of much debate by Biblical critics.

PHILIP, John Woodward, American naval officer, was born in New York City in 1840. He was appointed to the United States Naval academy, became midshipman in 1861, and served during the civil war in the gulf. In 1897 he was placed in command of the battleship *Texas*, which took a prominent part in the naval battle of Santiago during the Spanish-American war. In August, 1898, he was made commodore and was placed in command of the second squadron of the North Atlantic fleet, and in March, 1899, he was made rear-admiral and made commandant of the Brooklyn Navy yard. He died in 1900.

PHILLIPSBURG, a city in Warren co., N. J., on the Delaware river, and the Cent. of N. J., the Del., Lack. and West., the Lehigh Valley, and the Penn. railways; opposite Easton, Pa., 50

miles n.n.w. of Trenton. It is in an agricultural, iron-ore, and limestone region, and is noted for its extensive iron-works and their productions. Pop. 12,120.

PHILLIPS, Wendell, American abolitionist, born at Boston, 1811; died 1884. He was educated at Harvard university, studied law, and was called to the bar (1834); joined the movement for the abolition of slavery in 1837, and gave it the aid of his oratorical gifts and unremitting advocacy until in 1865 the negroes of the United States were made free citizens. His *Speeches, Letters, and Lectures* were published in 1863.

PHILOLOGY, or **COMPARATIVE PHILOLOGY**, a term commonly used as equivalent to the science of language, otherwise called Linguistic Science, or Linguistics. This science treats of language as a whole, of its nature and origin, etc., and of the different languages of the world in their general features, attempting to classify and arrange them according to such general features, and to settle in what relationship each stands to the others. The philologist as such does not study languages for practical purposes, or to be able to read and speak a number of them, though the more he is tolerably familiar with the better. He rather studies them in the way a naturalist studies a series of animals or plants, as if they were separate organisms each with a life and growth of its own. That every language has such a life and growth is true in a sense, for languages are continually in a state of change; yet a language is not to be regarded as an organism like a plant or an animal, but rather, to quote Professor Whitney, as an institution, an outcome of the needs of human beings for communication with their fellows. A language is a system of vocal sounds through which ideas are conveyed from person to person in virtue of the fact that certain ideas are attached or belong to certain sounds by a sort of convention or general understanding existing among those who use the language. That there is any natural law by which one idea belongs to one vocal sound rather than to another can hardly be affirmed in view of the fact that if we select any one idea we shall find that each of the thousand languages of the world expresses this idea by a different sound or group of sounds. Indeed, ideas can be conveyed otherwise than by vocal sounds, as witness the elaborate sign-language that has been developed in some communities, as also the finger-language of the deaf and dumb. We

can even conceive that a language of hieroglyphics or written symbols might exist with no spoken language alongside of it. We have, however, no knowledge of any such case, and, in fact, wherever man exists we find him making use of speech, which, indeed, is one of his most distinct and marked characteristics. As to the origin of language nothing is really known, although most probably it is an invention or acquisition of the human race, and not an original endowment.

To begin with our own language and the kindred tongues. Philology has succeeded in showing that the English language is one of a group of closely allied languages which are known by the general name of the Teutonic or Germanic tongues. The other languages of the group, some of which are more closely connected with English than the rest, are Dutch, German, Danish, Icelandic or Old Norse, Swedish, and Gothic; to which may be added, as of less importance and having more the character of dialects, Norwegian, Frisian, the Plattdeutsch or Low German of Northern Germany, and Flemish, which differs little from Dutch. The Teutonic tongues are often divided into three sections, based on closeness of relationship: the High German, of which the modern classical German is the representative; the Low German, including English, Dutch, Frisian, Plattdeutsch, and Gothic; and the Scandinavian, including Danish, Swedish, and Icelandic. Another division is into: East Germanic, including Gothic and Scandinavian; and West Germanic, including the others.

The evidence that all these languages are closely akin is to be found in the great number of words that they possess in common, in the similarity of their structure, their inflections, their manner of compounding words—in short, in their family likeness. This likeness can only be accounted for by supposing that these languages are all descended from one common language, the primitive Teutonic, which must have been spoken at a remote period by the ancestors of the present Teutonic peoples, there being then only one Teutonic people as well as one Teutonic tongue. In their earliest form, therefore, and when they began to be differentiated, these languages must have had the character of mere dialects, and it is only in so far as each has had a history and literature of its own that they have attained the rank of independent languages.

The Teutonic tongues, with the primitive or parent Teutonic from which they are descended, have been proved by the investigations of philologists to belong to a wider group or family of tongues, which has received the name of the Aryan, Indo-European, or (especially in Germany) Indo-Germanic family. The chief members of this family are the Teutonic, Slavonic (Polish, Russian, Bohemian), Lithuanian, Celtic (Welsh, Irish, Gaelic, etc.), Latin (or Italic), Greek (or Hellenic), Armenian Persian, and Sanskrit. Just as the Teutonic tongues are believed to be the offspring of one parent Teutonic tongue, so this parent Teutonic and the other

members of the Aryan family are all believed to be descended from one primitive language, the Aryan or Indo-European parent-speech. The people who spoke this primeval Aryan language, the ancestors (linguistically at least) of the Aryan races of Europe and Asia, are believed by many to have had their seat in Central Asia to the eastward of the southern extremity of the Caspian sea. This, however, is very problematical, and some philologists see reason to think that Europe may rather have been the original home of the Aryans. This latter view is now perhaps the one most generally held.

How remote the period may have been when the ancestors of the Teutons, the Celts, the Slavs, the Greeks, Romans, Persians, and Hindus were living together and speaking a common language is uncertain. Yet the general character of their language is approximately known, and philologists tell us with some confidence what consonant and what vowel sounds the Aryan parent-speech must have possessed, what were the forms of its inflections, and what, at the least, must have been the extent of its vocabulary, judging from the words that can still be traced as forming a common possession of the sister tongues of the family.

The Aryan tongues, ancient and modern, are entitled to claim the first rank among the languages of the globe, both for richness, harmony, and variety, and more especially as embodying a series of literatures to which no other family of tongues can show a parallel. Next in importance come the Semitic tongues—Hebrew, Chaldee, Syriac, Arabic, etc. These, like the Aryan tongues, form a well-marked family, one notable peculiarity of which is the possession of "triliteral" roots, or roots of which three consonants form the basis and give the general meaning, while inflection or modification of meaning is indicated by internal vowel-change. Thus the vowels play a subordinate part to the consonants, and do not, as in the Aryan tongues, associate with them on equal terms. Other important linguistic families are the Hamitic, which includes the ancient Egyptian, the Coptic, Berber, Galla, Somali, etc.; the Turanian or Ural-Altaic, which includes Turkish, Finnish, Hungarian, Mongolian, etc.; and the Southeastern Asiatic, which includes Chinese, Siamese, etc. The Turanian languages belong to the type known as agglutinate or agglutinating, being so called from the fact that the root always maintains a sort of independence or distinctive existence, the other elements of the word being more or less loosely "glued" or stuck on as it were. The Chinese is the chief of the monosyllabic languages, so called from their words consisting normally of monosyllables. Other families of languages are the Malayo-Polynesian of the Indian Archipelago and Pacific; the Bantu, a great family of South Africa; and the American Indian languages, which are characterized as polysynthetic, from the way in which they crowd as many ideas as possible into one unwieldy expression. All these families form groups, so far as is known,

separate from and independent of each other; and attempts to connect any two of them, as Aryan and Semitic, for instance, have met with little success. Formerly etymologists had no hesitation in deriving English words from Hebrew roots, but this was in the days when there was no science of comparative philology. That all languages are descendants of one original tongue, as is believed by many, linguistic science can neither affirm nor deny. We may add that community of language is not a proof of community race, since it is well known that, as the result of war or otherwise, races have given up the language that once belonged to them and adopted some other.

PHILOMELA, in Greek mythology, a daughter of Pandion, king of Athens, who being violated and deprived of her tongue by Tereus, the husband of her sister Progne made known her wrong to the latter by embroidering it in tapestry. In revenge the sisters murdered Itys, the son of Progne by Tereus, and served him up to his father. Tereus pursued them, but they were changed by the gods into birds, Philomela and Progne into a nightingale and a swallow, and Tereus into a lapwing.

PHILOSOPHER'S STONE. See Alchymy.

PHILOSOPHY, a term first brought into general use by Socrates. Philosophy is the science that deals with the general principles which form the basis of the other sciences, and of which they themselves take no cognizance. It follows up the data of experience to their ultimate grounds, regarding each particular fact in relation only to a final principle, and as a determinate link in the system of knowledge. In this view philosophy may be defined as the science of principles.

For all practical purposes the history of philosophy may be treated as commencing with the Greeks, the philosophic notions of the inhabitants of the East being considered merely as introductory to the Greek philosophy, in which many oriental notions were incorporated. The first problem of Greek philosophy was to explain the enigma of external nature, to solve the problem not of the soul but of the world. Thales (about 600 B.C.) stands at the head of the Ionian school which, with the Eleatic school, was the chief representative of speculative thought in pre-Socratic times; the former of these schools being characterized by Aristotle as seeking to find a material, the latter a formal principle of all things. In Socrates (470-399 B.C.), who united scientific method and a high ethical and religious spirit, the destructive teaching of the Sophists found its keenest opponent. What are called the minor Socratic school—the Cynics, Cyrenaics, and Megarians—severally professed to regard Socrates, as their founder, the Cynics, however, defining the end of action as self-sufficiency, the Cyrenaics as pleasure, and the Megarians as reason. With Plato (430-347) philosophy lost its one-sided character. Though professedly a disciple of Socrates his system of idealism is his own. The Platonic idea is the pure archetypal

essence, which is the source of all the finite realities that correspond to it. The visible world in an inferior reproduction of the world of pure ideas, where shine in all their splendor the good, the true, and the beautiful. In logic Plato brings back science to general ideas. In ethics the highest end of man is regarded as the unity of his nature. Plato's ideal theory is criticised by Aristotle, because he gives no real explanation of the connection between the phenomenal and the ideal. In Aristotle's own system, instead of beginning with the general and the absolute, as Plato had done, he begins with the particular and individual. His whole philosophy is a description of the given and empirical; and his method is induction. His system presents us with a number of co-ordinate sciences, each having its independent foundation, but no highest science which should comprehend them all. The three schools of Greek philosophy which followed the systems of Plato and Aristotle, and which mark the declining days of Greece, are those of the Stoics, Epicureans, and Sceptics.

Modern philosophy, which begins with the 15th century, is characterized by a freer, more independent spirit of inquiry. First the scholastic philosophy was attacked by those who called to mind the ancient Greek philosophy in its original purity. After this struggle new views were presented. Bacon and Locke on the one hand, and Descartes on the other, stand respectively at the head of the two systems—empiricism and idealism, which begin modern philosophy. Bacon created no definite system of philosophy, but gave a new direction to thought, the empiricism which he founded finally developing into scepticism. The system of Descartes was opposed by Gassendi, and received modifications at the hands of others, especially Malebranche. The most important successor, however, of Descartes was Spinoza, who reduced the three Cartesian substances to unity, to one infinite original substance, the ground of all things, that excludes from itself all negation or determination, and is named God or nature. Locke (1632-1704), who had a precursor in Hobbes (1588-1679), the influence of whom, however, chiefly concerned the history of political science, is regarded as the father of modern materialism and empiricism. As occupying the general position of Locke mention may be made of Isaac Newton, Samuel Clarke, William Wollaston, the Earl of Shaftesbury, and Francis Hutcheson. The philosophy of Locke received a further development in France, where Condillac sought to explain the development of humanity by the simple development of the sensations. Then followed the materialism of Helvetius, d'Holbach, La Mettrie, and others including several of the Encyclopedists. In opposition to this materialistic tendency arose the idealism of Leibnitz and Berkeley. The theories of Leibnitz were systematized by Wolff, and from his time to Kant German philosophy assumed no new stand-point. It was reserved for Hume to trace out the ultimate consequences of the Cartesian and Lockian philosophy, and to produce

the great metaphysical revolution of which Reid and Kant were the first movers. Kant (1724-1804), who may be justly regarded as the father of the philosophy of the 19th century, sought to bring together into unity the one-sided endeavors of his predecessors in the realistic and idealistic schools. He took up a critical stand-point, and from it instituted an inquiry into the origin of our experience or cognition. In the hands of Fichte the critical idealism of Kant becomes absolutely subjective idealism. "All that is, is ego;" this is the principle of the Fichtian system; the world is merely phenomenal, consciousness is a phenomenon, perception is a dream. Fichte's subjective idealism found its continuation in the objective idealism of Schelling and the absolute idealism of Hegel. Hegel (1770-1831), developed the principle of identity, and created the system of absolute idealism. In his philosophy he aims at elevating consciousness to the standpoint of absolute knowledge, and systematically developing the entire contents of this knowledge by means of the dialectical method. Schleiermacher (1768-1834) promulgated an eclecticism to which Plato, Spinoza, Kant, and Schelling were the chief contributors. Schopenhauer (1788-1860) developed a doctrine which may be described as a transitional form from the idealism of Kant to the realism at present prevalent. In France two philosophical tendencies opposed the sensualism and materialism so universal at the beginning of last century. Of these the one was theosophical and the other found expression in the eclectic and spiritualistic school founded by Royer-Collard as the disciple of Reid, and further built up by Cousin, who incorporated into its body of doctrines a number of German philosophical notions. Jouffroy attempted to unite the philosophy of his predecessor Maine de Biran to that of the Scottish school, and became associated with the spiritualistic school, to which also belong the names of Garnier, Janet, Rémusat, Franck, Jules Simon, and others. This school has contended valiantly against the pantheistic tendencies of the age. Independent systems are those of Piere Leroux, Lamennais, Jean Reynaud, and Buchez. Materialism has its supporters in Cabanis, who sees in thought only a secretion of the brain, Broussais, Gall, and others. Positivism, founded by Auguste Comte, numbers not a few followers.

In Great Britain the associational psychology of Hartley, Priestley, and Dr. Darwin found representatives in the 19th century in James Mill (1773-1836) and his son John Stuart Mill (1806-73), who make the principal of association the sole explanation of psychical phenomena. Bain, Grote, and Lewes followed more or less in the same track. Herbert Spencer attempted to widen the psychological principles of the associational psychology into a universal doctrine of evolution. In America, as in England, philosophy has been prosecuted more as an applied science, and in its special relations to morals, politics, and theology. Among the best-known names are those of Jonathan Edwards, Henry P. Tappan, Thomas C. Upham, Francis Wayland,

and others. A modified scholasticism, mostly Thomism, prevails in the catholic seminaries of France, Spain, and Italy. In most of the continental countries, German philosophy has exerted no small influence. In Italy a peculiar philosophical school, represented by Rosmini, Mamiani, and Gioberti, has flourished during the 19th century.

PHILTRE, a potion supposed to have the power of exciting love. The preparation was frequently associated with magic rites, and the ingredients were frequently of a harmless, fanciful, or disgusting kind. At times, however, poisonous drugs were employed, the death of Lucretius and the madness of Caligula being alike ascribed to philtres administered by their wives.

PHLEBOTOMY, or **VENESECTION**, the act of letting blood by opening a vein; a method of treatment formerly applied to almost all diseases, but now chiefly confined to cases of general or local plethora. Another mode of letting blood is by cupping or by the application of leeches. It has been one of the processes of the medical profession from the earliest times.

PHLOX, a genus of perennial herbaceous plants, natives for the most part of North America, though some of the species are to be met with in Asia. The flowers are of a purple or violet color, more rarely white or red, with a salver-shaped corolla, and a narrow sub-cylindrical tube longer than the calyx. The trailing kinds are excellent for rock-work.

PHŒBUS. See Apollo.

PHŒNICIA, in ancient geography, a country on the coast of Syria, bounded on the east by Mount Lebanon, and containing the celebrated cities Tyre and Sidon. Phœnicia proper was a tract of country stretching along the eastern shore of the Mediterranean, not much more than 28 miles in length, and little more than 1 mile in average breadth; Sidon being situated near its northern, and Tyre not far from its southern boundary. In a wider sense Phœnicia was regarded as beginning on the north with the Island of Aradus, and extending south to the town of Dora, a little below the promontory of Carmel, being about 120 miles in length, and rarely more than 20 in breadth. It is watered by several streams flowing from Lebanon to the sea, such as the Eleutherus, the Adonis, the Lycus, the Tamyras, the Leontes. The country is fertile in timber, corn, fruits, etc.; and besides the great cities of Sidon and Tyre, it was anciently studded with numerous smaller towns, forming almost an unbroken line along the coast. Among these towns in earlier times were Arvad, Accho, Arka, Tripolis, Berytus, Sarepta, Dora, etc. Many of the roadsteads or harbors were excellent, but are now silted up.

The wealth and power of the Phœnicians arose from their command of the sea, and it was their policy not to provoke any of the nations to the east of them, and not to quarrel unnecessarily with Israel, which was their granary. The relation between Hiram and David was probably but a sample of such international treaties and intercourse. After

the division of the Hebrew kingdom Phœnicia would naturally cultivate alliance with the Ten Tribes nearest to it, and Ahab married a Phœnician princess. The country was afterward successively incorporated in the Assyrian, Babylonian, and Persian empires, but the cities retained more or less their independence. It was next conquered by Alexander the Great, and henceforth simply formed part of Syria.

From a very early period the Phœnicians occupied themselves in distant voyages, and they must speedily have reached to a style of substantial ship-building. Xenophon passes a high eulogy on a Phœnician ship; and they were skilled in navigation and the nautical applications of astronomy. Lebanon supplied them with abundance of timber and Cyprus gave them all necessary naval equipments, from the keel to the top-sails. In the reign of Pharaoh-Necho these daring navigators even circumnavigated Africa, and the Phœnicians furnished Xerxes with 300 ships, which took part in the battle of Salamis. The commerce of Tyre reached through the world. It traded in the produce of the whole known world, from the ivory and "bright iron" and ebony and cotton fabrics of India to the tin from Cornwall and Devonshire. Fishing was also an important industry, and the Tyrians sold fish in Jerusalem. The Phœnicians excelled in the manufacture of the purple dye from the shell-fish murex, abundant on its coasts. The glass of Sidon was no less famous than the Tyrian dye. Phœnicia produced also articles of silver and gold as well as of brass; its inhabitants were also skilled in architecture and in mining.

The maritime knowledge and experience of Phœnicia led to the plantation of numerous colonies in Cyprus, Rhodes, and the islands of the Ægean—the Cyclades and Sporades—in Sicily, in Sardinia, the Balearic islands, and in Spain. The most celebrated of the Phœnician colonies, however, was Carthage, in Northern Africa, which extended its sway over the Spanish peninsula and disputed with Rome the supremacy of the Mediterranean.

As was the case in Canaan at the invasion, each Phœnician city was governed by a king or petty chief. A powerful aristocracy existed in the chief towns, and there were also elective magistrates, called by the Romans *suffetes*, a disguised form of the Hebrew *soffet*. Sidon, and afterward Tyre, exercised a hegemony over the other states. The relation of Phœnicia to her colonies does not seem to have been very close. Their religion, however, bound the mother country and the colonies in a common worship. Carthage often sent presents to the chief Phœnician god; so did Gades and other settlements.

While the wealth and commerce of Phœnicia must have brought art and refinement, the people were noted for their dissoluteness. As a people the Phœnicians early obtained a reputation for cunning and faithlessness. They were often pirates; they were certainly slave-traders. They purchased slaves from the northern shores of the Black sea,

and they also kidnaped and sold the children of Israel—a practice which brought upon them the denunciation of the prophets, and a just retaliation was predicted to fall upon them.

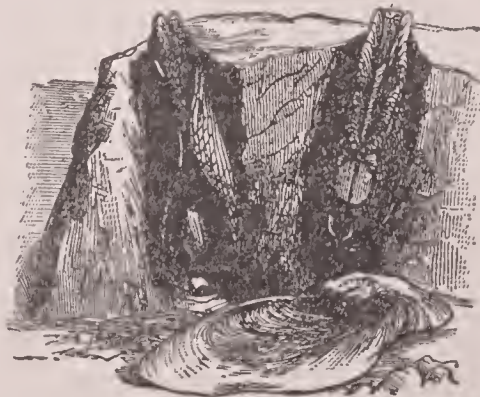
The language of ancient Phœnicia was closely akin to Hebrew. The famous passage in the *Pœnulus* of Plautus illustrates the assertion. Of ninety-four words on a tablet discovered at Marseilles in 1845 relating to the sacrificial ritual no less than seventy-four are found in the Old Testament. Coins and seals also disclose the same affinity, as do the numerous inscriptions. Proper names can all be explained in the same way. The invention of letters is often ascribed to the Phœnicians. The Greeks believed that letters had been brought to them from Phœnicia by Cadmus. The so-called Cadmean letters of the Greek alphabet are A B Γ Δ E F I K L M N O II P Σ T, the sixth letter F being the digamma, which afterward disappeared from the Greek alphabet. The names of these letters have no meaning in Greek, but they have each a significance in Phœnician or Hebrew. The affinity of the old Greek letters in form to the Phœnician and early Hebrew can be easily traced. The literature of Phœnicia has perished. See also Tyre, Sidon, Carthage, etc.

PHOENIX, a fabulous Egyptian bird, about the size of an eagle, with plumage partly red and partly golden. Of the various stories told of it by Herodotus and others the most popular is to the effect that the bird, at an age of 500 years, conscious of its approaching death, built a funeral pile of wood and aromatic gums, which it lighted with the fanning of its wings, and rose from the flames with a new life. The Egyptians regarded it as a symbol of immortality, and it is still used as an emblem of this.

PHOENIX, the scientific name of the date palm genus.

PHOENIXVILLE, a town of the United States, in Chester co., Pennsylvania, on the Schuylkill, with extensive ironworks. Pop. 10,722.

PHOLAS, a genus of marine bivalves, in which the shell gapes at both ends. The shell, which is of thin white texture, is studded over on its outer surface with numerous rasp-like promi-



Pholades in their holes.

nences, by means of which the animal excavates burrows in wood, rocks, indurated clay, etc., maintaining com-

munication with the outer world by means of long breathing-tubes or siphons with fringed edges.

PHONETICS, the science which treats of the various sounds pertaining to human speech, their distinctive characteristics, the voice-mechanism by which they are uttered, and the methods by which they may be best represented to the eye. Any system of writing is strictly phonetic when by it each different sound is represented by a different character, and the same sound always by the same character.

PHONOGRAPH, an instrument by means of which sounds can be permanently registered, and afterward reproduced from the register. It consists essentially of a curved tube, one end of which is fitted with a mouthpiece, while the other end (about 2 inches in diameter) is closed in with a disc or diaphragm of exceedingly thin



Phonograph.

metal. Connected with the center of this diaphragm is a steel point, which, when the sounds are projected on the disc from the mouthpiece, vibrates backward and forward. This part of the apparatus is adjusted to a cylinder which rotates on a horizontal axis. On the surface of the cylinder is cut a spiral groove, and on the axis there is a spiral screw of the same pitch, which works in a nut. When the instrument is to be used a piece of tin-foil is gummed round the cylinder, and the steel point is adjusted so as to be just touching the tin-foil, and above the line of the spiral groove. If some words are now spoken through the mouthpiece, and the cylinder kept rotating either by the hand or clockwork, a series of small indentations are made on the foil by the vibratory movement of the steel point, and these markings have all an individual character of their own, due to the various sounds addressed to the mouthpiece. The sounds thus registered are reproduced by approaching the diaphragm and its steel point toward the tin-foil as at first commencing, at the point where it was when the cylinder originally started, and then once more setting the cylinder in motion. The indentations

previously made now cause the steel point to rise or fall or otherwise move as the markings pass under it, and the result is that the diaphragm is thrown into a state of vibration exactly corresponding to the movements induced by the markings, and thus affects the air around so as to produce sounds, and these vibrations, being exactly similar to those originally made by the voice, necessarily reproduce these sounds to the ear as the words at first spoken. Instead of these tin-foil strips hollow cylinders of wax are now commonly used. In this case the record consists of a series of markings cut into the wax by a fine steel point. The same cylinders can be used a large number of times, the previous record being always shaved off and a new surface thus obtained.

PHONOGRAPHY, a system of writing by which the sounds of a language are accurately represented. The name is generally applied to Pitman's system of shorthand. See Shorthand.

PHONOMETER, an instrument for ascertaining the number of vibrations of a given sound in a given space of time.

PHOSPHATE, in chemistry, the generic term for the salts formed by the union of phosphoric anhydride with bases or water or both. They play a leading part in the chemistry of animal and plant life, the most important in this connection being the phosphate of soda, phosphate of lime, and the basic phosphate of magnesia. In agriculture the adequate supply of phosphates to plants in the form of manures becomes a matter of necessity in all depleted soils. These phosphatic manures consist for the most part of bones, ground ones, mineral phosphates (apatite, phosphorite, coprolites), basic slag, superphosphates and reduced superphosphates (both prepared by treating broken-up bones with vitriol), bone-ash, and phosphatic guano. See also Manures.

PHOSPHIDES, compounds of phosphorus with one other element, more especially with the metals.

PHOSPHORESCENCE, the property which certain bodies possess of becoming luminous without undergoing obvious combustion. It is sometimes a chemical, sometimes a physical action. Certain mineral substances exhibit the phenomenon when submitted to insolation, to heat, to friction, to electricity, or to cleavage. Rain, water-spouts, and meteoric dust sometimes present a self-luminous appearance. Several vegetable organisms, chiefly cryptogams, exhibit this kind of luminosity; but the most interesting cases of phosphorescence occur in the animal world, the species in which the luminous property has been observed belonging nearly to every main group of the zoological series. In some of the lowest life forms and in many of the jelly-fishes the whole surface of the body is phosphorescent; in other organisms the phosphorescent property is localized in certain organs, as in the sea-pens, certain annelids, the glow-worms, fire-flies, etc.; while many deep-sea fishes have shining bodies embedded in the skin. The phosphorescence of the sea is produced by

the scintillating or phosphorescent light emitted from the bodies of certain microscopic marine animals, and is well seen on the surface of the ocean at night. Phosphorescence in animals appears to be a vital process, consisting essentially in the conversion of nervous force (vital energy) into light; just as the same force can be converted by certain fishes into electricity. See Fluorescence.

PHOSPHORIC ACID, an acid usually obtained by burning phosphoretted hydrogen in atmospheric air or oxygen. It is also produced by the oxidation of phosphorous acid, by oxidizing phosphorus with nitric acid, by the decomposition of apatite and other native phosphates, and in various other ways. It is used in medicine in the form of solution, constituting the dilute acid of the Pharmacopœia. It is peculiarly suited to disordered states of the mucous surfaces, and also to states of debility, characterized by softening of the bones.

PHOSPHORITE, a species of calcareous earth; a sub-species of apatite. It is an amorphous phosphate of lime, and is valuable as a fertilizer.

PHOSPHOROSCOPE, an instrument designed to show the phosphorescence of certain bodies that emit light but for a very short period. By its means many substances hitherto unsuspected of phosphorescence have been proved capable of retaining light for very short periods. The name is also given to a philosophical toy for showing phosphorescent substances in the dark.

PHOSPHOROUS ACID, an acid produced by exposing sticks of phosphorus to moist air, and in several other ways. Phosphorous acid exists usually in the form of a thick uncrystallizable syrup, but it may also be obtained crystallized.

PHOSPHORUS, a solid non-metallic combustible substance ranking as one of the elements; symbol P, atomic weight 31; specific gravity 1.826. It occurs chiefly in combination with oxygen, calcium, and magnesium, in volcanic and other rocks, whose disintegration constitutes very fertile soils. It exists also in the plants used by man as food, and is a never-failing and important constituent in animal structures. It is manufactured from bones, which consist in part of phosphate of lime, or from native mineral phosphate of lime. Common phosphorus when pure is almost transparent and colorless. At common temperatures it is a soft solid, easily cut with a knife, and the cut surface, has a waxy luster; at 108° it fuses, and at 550° is converted into vapor. It is exceedingly inflammable. Exposed to the air at common temperatures it undergoes slow combustion, emits a white vapor of a peculiar alliaceous odor, appears luminous in the dark, and is gradually consumed. On this account phosphorus should always be kept under water. A very slight degree of heat is sufficient to inflame phosphorus in the open air. Gentle pressure between the fingers, friction, or a temperature not much above its point of fusion, kindles it readily. It burns rapidly even in the air, emitting a splendid white light, and causing intense heat. Its combustion is far more rapid in oxygen gas, and the light far more vivid. The product of

the perfect combustion of phosphorus is phosphorous pentoxide or phosphoric anhydride, a white solid which readily takes up water, passing into phosphoric acid. Compounds of phosphoric anhydride with basic bodies are known as phosphates. Phosphorus may be made to combine with most of the metals, forming compounds called phosphides. When dissolved in fat oils it forms a solution which is luminous in the dark. It is chiefly used in the preparation of lucifer-matches, and also in the preparation of phosphoric acid. It is of all stimulants the most powerful and diffusible, but on account of its activity highly dangerous. It can be safely administered as a medicine only in extremely minute doses and with the utmost possible caution. Phosphorus presents a good example of allotropy, in that it can be exhibited in at least one other form, known as red or amorphous phosphorus, presenting completely different properties from common phosphorus. This variety is produced by keeping common phosphorus a long time slightly below the boiling-point. It is a red, hard, brittle substance, not fusible, not poisonous, and not readily inflammable so that it may be handled with impunity. When heated to the boiling-point it changes back to common phosphorus.

PHOTO-ENGRAVING, a common name of many processes in which the action of light on a sensitized surface is made to change the nature or condition of the substance of the plate or its coating, so that it may by processes be made to afford a printing surface corresponding to the original from which the photographic image was derived. See Zinc Etching, Halftone Engraving.

PHOTOGRAPHY is the art of taking representations of objects by the action of light through the lenses of the camera obscura on a previously prepared surface. It is of comparatively recent origin, though, as early as the commencement of the 19th century, Mr. Thomas Wedgwood had discovered a method of copying paintings on glass and of making profiles by the action of light upon nitrate of silver. About 1814 M. Nicéphore Niepce in France discovered a method of producing, by means of the camera obscura, pictures on plates of metal coated with asphaltum, and at the same time of rendering them permanent. In 1839 Daguerre announced the discovery of the Daguerreotype. In the meantime, however, Mr. Henry Fox Talbot had discovered the process of obtaining pictures in the camera by the agency of light on paper coated with chloride and nitrate of silver, and also of fixing them when so obtained. Mr. Talbot gave the name of calotype to his process. Numerous modifications of the calotype were introduced, besides various new photographic processes, the most important being those of M. Niepce de St. Victor and Mr. Scott Archer, the former of whom introduced the use of albumen and the latter that of collodion as a substitute for paper, these substances being in either case thinly spread over a plate of glass. Mr. Archer perfected the wet collodion process, and published full working details in

1851. Collodion dry plates were introduced by Dr. Hill Norris in 1856; collodion emulsion dry plates by Messrs. Sayce and Bolton in 1864. In 1871 Dr. R. L. Maddox discovered that glass plates could be coated with an emulsion consisting of bromide of silver contained in gelatine. This gelatine dry-plate process was improved by Bennett in 1878, and came into general use about 1880. It is now almost the only process employed in ordinary photography.

Photographs may be either negative or positive. Negative photographs are produced in the camera, and exhibit the lights and shades contrary to nature, that is, the lights dark and shades white. In order to obtain prints or positives several methods are used. In silver printing a paper sensitized by being floated on a solution of albumen mixed with common salt, and then on a solution of nitrate of silver, is placed in close contact with the negative in a printing-frame, and exposed to light until the silver compounds have become sufficiently darkened. It is afterward toned, fixed, and washed. In the platinotype process the paper is sensitized by ferric oxalate and a double salt of potassium and platinum. The latter process requires no toning, and produces a permanent print.

Various modes of multiplying photographic pictures by photolithography have been successfully tried. A common mode is to take a print on paper sensitized with gelatine and bichromate of potassium, and to ink it with a suitable oily ink. This ink adheres to the parts where the gelatine has been acted on by light and has become insoluble, but where the gelatine is still soluble the ink can be easily washed off. It is then transferred to a lithographic stone in the usual way. In photo-zincography the process consists in projecting an impression on a plate of prepared zinc by photography and then engraving it by etching with acids, so that copies can be printed from the plate. Since the introduction of the gelatine plate the art of photography has made immense advances, and its applications are endless. Hand (sometimes called detective) cameras in all shapes and sizes have been introduced, some of which take pictures of $\frac{1}{2}$ and $\frac{1}{4}$ plate size. Many improvements have also been made in instantaneous shutters. These are now so carefully adjusted by mechanical appliances that they can be regulated to a small fraction of a second, or a prolonged exposure can be given to any part of the subject at will. These instantaneous processes have enabled scientists to analyse muscular movements and the various modes of locomotion. Remarkable results have also been attained in the application of photography to astronomy, and pictures of the most remote parts of the heavens are now common. Its application in the various processes of book-illustration has also been very successful. Photography by means of artificial light is regularly practiced. Recently it has been discovered that by means of a current of electricity and a glass globe or tube exhausted of air, rays may be produced which penetrate many solid substances

though unable to penetrate others, and which give an image of such opaque bodies on a photographic plate. By these rays (X-rays, Röntgen rays) we may get a photograph (or radiograph) showing, for instance, the bones in the hand, the coins in a purse, etc.

PHOTOGRAPHURE, a process of engraving in which by the aid of photography subjects are reproduced as plates suited for printing in a copper-plate press. The process known as Helio-graphure (which see) is essentially the same.

PHOTO-HELIOGRAPH, an instrument for observing transits of Venus and other solar phenomena, consisting of a telescope mounted for photography on an equatorial stand and moved by suitable clockwork.

PHOTO-LITHOGRAPHY. See Photography.

PHOTOMETER, an instrument intended to indicate relative quantities of light, as in a cloudy or bright day, or to enable two light-giving bodies to be compared. Photometers depend on one or other of the two principles, that the eye can distinguish whether two adjacent surfaces are equally illuminated, and whether two contiguous shadows have the same depth. Benson's photometer is based on the former principle, Ruinford's on the latter. The common unit for comparison is the light emitted by a sperm-candle burning 120 grains of spermaceti per hour, other lights being said to have the intensity of so many candles. Improved forms of photometers for more easily obtaining the illuminating power produced by coal-gas and the electric light have recently been introduced.

PHOTOPHONE, an instrument invented in 1880 by Prof. Graham Bell, which resembles the telephone, except that it transmits sounds by means of a beam of light instead of the connecting wire of the telephone. The success of the instrument depends upon a peculiar property of the rare metal selenium, that, namely, of offering more or less opposition to the passage of electricity according as it is acted upon or not by light. In its simplest form the apparatus consists at the receiving end of a plane mirror of some flexible material (such as silvered mica) upon which a beam of light is concentrated, and the voice of a speaker directed against the back of this mirror throws the beam of light reflected from its surface into undulations which are received on a parabolic reflector at the other end, and are centered on a sensitive selenium cell in connection with a telephone, which reproduces in articulate speech the undulations set up in the beam of light by the voice of the speaker.

PHOTOSPHERE, the luminous envelope, supposed to consist of incandescent matter, surrounding the sun. See Sun.

PHOTO-ZINCOGRAPHY. See Photography.

PHRENOLOGY, the term applied to the psychological theories of Gall and Spurzheim, founded upon (1) the discovery that the brain, as the organ of the mind, is not so much a single organ as a complex congeries of organs; and (2)

observations as to the existence of a certain correspondence between the aptitudes of the individual and the configuration of his skull. Phrenology may therefore be regarded as a development, partly scientific and partly empirical, of the general idea that a correspondence exists between the physical structure and the psychical and mental traits of every individual man or animal. It was long ago observed by physiologists that in animals a certain character and intelligence seemed to accompany a certain formation and size of skull. Lavater, in his system of physiognomy, went further than this, and gave to particular shapes of the head certain powers and passions: the conical head he terms religious; the narrow retreating front, weak-minded; the broad neck, salacious, etc. But it was reserved to Drs. Gall and Spurzheim to expand this germ of doctrine into a minute system, and to map out the whole cranium into small sections, each section being the dwelling-place of a certain faculty, propensity, or sentiment.

So far as phrenology was scientific it undoubtedly was one cause which led to the minute anatomical investigations to which the brain has latterly been subjected; and Gall and Spurzheim have high claims to be regarded as anatomical discoverers and pioneers. Previous to their dissections the brain had generally been regarded as a single organ rather than a complex congeries of organs. Gall's view of the physiology of the brain was, that the convolutions are distinct nervous centers, each having its own special activity; that the frontal lobes are occupied by the perceptive group of centers; the superior lobes by the moral and æsthetic groups; the inferior lobes by the group mainly concerned in the nutrition and adaptation of the animal to external conditions; and the posterior lobes to the social instincts. To a considerable extent these views have been pronounced to be well founded by later specialists, and thus the leading positions of Gall and Spurzheim have taken a place in scientific psychology as represented by Bain, Carpenter, Ferrier, Wagner, Huschke, and others.

PTHIO'TIS, a district of ancient Greece, in the south of Thessaly, now forming a monarchy of Greece. Pop. 128,440.

PTHISIS (thi'sis). See Consumption.

PHYLACTERY, among the Jews a strip of parchment inscribed with certain texts from the Old Testament, and inclosed within a small leathern case, which was fastened with straps on the forehead just above and between the eyes, and on the left arm near the region of the heart. The four passages inscribed upon the phylactery were Ex. xiii. 1-10, 11-16; Deut. vi. 4-9; xi. 18-21. The custom was founded on a literal interpretation of Ex. xiii. 16; Deut. vi. 8; xi. 18. Phylacteries are the "prayer-thongs" of the modern Jews. In their origin they were regarded as amulets, which protected the wearer from the power of demons, and hence their name, which is from the Greek *phylassein*, to guard.

PHYLLOXERA, a genus of plant-lice. The type of the genus is a species which

lives upon oak-trees; but the *Phylloxera vastatrix*, or grape *Phylloxera*, a species which injuriously affects the vine, has attracted so much attention of late years that it has come to be known as the *Phylloxera*. Its proper home is North America, where it was known early in the history of grape-culture, and where it doubtless existed on wild vines from time immemorial. It was discovered in England in 1863, and about the same time it made its appearance in France. In 1885 its presence was discovered in Australia, at the Cape of Good Hope, and in Algeria; and, generally speaking, it has now obtained a foothold, at least in restricted localities, in every country where the grapevine is cultivated. Vines attacked by *Phylloxera* generally show external signs the second year of attack in a sickly yellowish appearance of the foliage and in stunted growth, and the third year they frequently perish, all the finer roots having decayed and wasted away. Many remedies have been proposed, but none are universally practicable or satisfactory.

PHYSA'LIA, a genus of marine animals. One species is known by the name of the Portuguese man-of-war. These hydrozoa are characterized by the presence of one or more large air-sacs, by which they float on the surface of the ocean. Numerous tentacles depend from



Portuguese man-of-war.

the under side, one class short and the other long. The shorter are the nutritive individuals of the colony, the longer, which in a *Physalia* 5 or 6 inches long are capable of being extended to 12 or 18 feet, possess a remarkable stinging power, and are probably used to stun their prey.

PHYSICAL GEOGRAPHY is that branch of geography which treats of the surface of the earth, or of any part of it as regards its natural features and conformation, the changes that are constantly taking place and that have formerly taken place so as to produce the features now existing; it points out the natural divisions of the earth into land and water, continents, islands, rivers, seas, oceans, etc.; treating of the external configuration of mountains, valleys, coasts, etc.; and of the relation and peculiarities of different portions of the water area, including currents, wave-action, depth of the sea, salt and fresh water lakes, the drainage of countries, etc. The atmosphere in its larger features is also considered, including the questions of climate, winds, storms,

rainfall, and meteorology generally. Lastly it takes up various questions connected with the organic life of the globe, more especially the distribution of animals and plants, and their relation to their environment; tracing the influence of climate, soil, natural barriers or channels of communication, etc., upon the growth and spread of plants and animals, including in the latter the various races of man. The field of physical geography is thus by no means easy to confine within strict limits, as it is so closely connected at various points with geology, mineralogy, botany and zoology, chemistry, ethnology, etc.

PHYSICS, or **NATURAL PHILOSOPHY**, is the study of the phenomena of the material world, or of the laws and properties of matter; more restrictedly it treats of the properties of bodies as bodies, and of the phenomena produced by the action of the various forces on matter in the mass. It thus has as its chief branches the subjects dynamics, hydrostatics, heat, light, sound, electricity, and magnetism. See the different articles.

PHYSIOG'NOMY, the doctrine which teaches the means of judging of character from the countenance. Aristotle is the first who is known to have made any attempts in physiognomy. He observed that each animal has a special predominant instinct; as the fox cunning, the wolf ferocity, and so forth, and he thence concluded that men whose features resemble those of certain animals will have similar qualities to those animals. Baptista della Porta, in his work *De Humana Physiognomia* (1586), revived this theory and carried it out further. The theory was adopted and illustrated by the French painter Lebrun, in the next century, and by Tischbein, a German painter of the 18th century. The physiologist Camper sought new data in a comparison of the heads of different types of the human species, and in attempting to deduce the degree of intelligence belonging to each type from the size of the facial angle. Lavater was the first to develop an elaborate system of physiognomy, the scope of which he enlarged so as to include all the relations between the physical and moral nature of man.

PHYSIOG'RAPHY, a term often used as equivalent to physical geography; but otherwise used to embrace the aggregate of information necessary to be acquired as a preliminary to the thorough study of physical geography, or as an introduction to the study of nature and its forces.

PHYSIOLOG'Y, in medical and biological science the department of inquiry which investigates the functions of living beings. In its wide sense the living functions of both animals and plants fall to be investigated by physiology, this division of the subject being comprehended under the terms comparative physiology and animal and vegetable physiology. When more specially applied to the investigation of the functions in man the appellation human physiology is applied to the science. The importance of physiological inquiry in connection with the observation of diseased conditions cannot be

overrated. The knowledge of healthy functions is absolutely necessary for the perfect understanding of diseased conditions; and the science of pathology, dealing with the causes and progress of diseases, may in this way be said to arise from, and to depend upon, physiological inquiry. Physiology in itself thus forms a link connecting together the various branches of natural history or biology and those sciences which are more specially included within a medical curriculum. The history of scientific physiology may be said to begin with Aristotle (384-322 B.C.), who attained no mean knowledge of the subject. The Alexandrian school, flourishing about 280 B.C. under the Ptolemies, and represented by Erasistratus, Herophilus, and others, obtained greater opportunities for the acquirement of physiological knowledge, through the investigation of the bodies of criminals who had been executed. Erasistratus thus threw much light on the nervous system and its physiology; while Herophilus made important observations on the pulse, and in addition discovered the lacteal or absorbent vessels. After this there was a period of decline, but Galen, living in the 2d century after Christ, again raised the science to a respectable position, and effected a vast advance and improvement in physiological knowledge. The systems which succeeded Galen and his times consisted, until about 1543, of absurd speculations and theories, conducive in no respect to the advance of true knowledge. In 1543 Vesalius paved the way toward the more scientific epochs of modern times by his investigations into the anatomy and structure of the human frame. In 1619 Harvey, the "father of modern physiology," discovered the circulation of the blood. Since this time the history of physiology has gone hand in hand with the general history of anatomy (which see). One noteworthy peculiarity of modern physiological research consists in the introduction and extensive use of the experimental mode of investigation in physiology; and of elaborate and delicate instruments and apparatus, such as the sphygmograph, or pulse-recorder; the ophthalmoscope; the laryngoscope, and the microscope. The different departments of physiology may be enumerated as comprehending the investigation of the three great functions which every living being performs, namely, (1) nutrition, including all that pertains to digestion, the circulation, and respiration; (2) innervation, comprising the functions performed by the nervous system; (3) reproduction, which ensures the continuation of the species and includes also the phenomena of development. See the articles Digestion, Respiration, Skin, Eye, Ear, Larynx, Tongue, etc.

PIACENZA (pyá-chen'tsá), a town of North Italy, capital of province of same name. The manufactures consist of cotton goods, woollens, stockings, hats, leather, etc., and there are also several silk-spinning and paper-mills. Pop. 34,987. The province belongs to the basin of the Po, and is generally fertile; area, 965 sq. miles; pop., 245,126.

PIANO, soft, low; used in music in



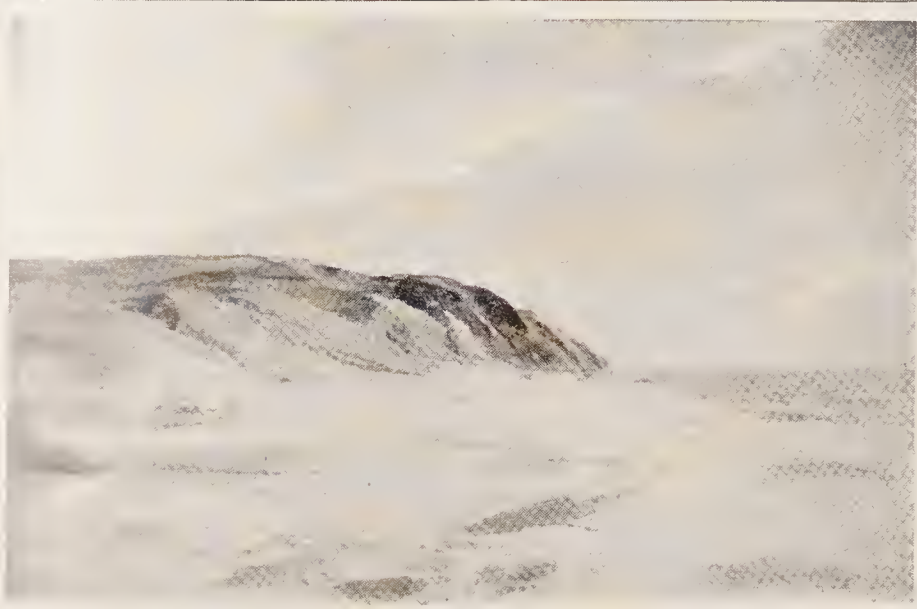
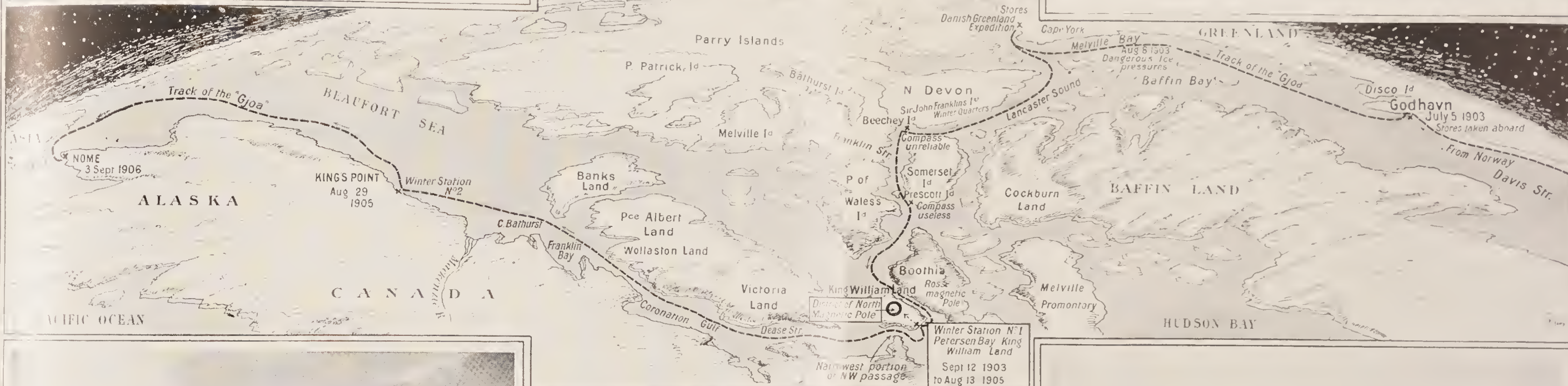
The "Gjoa" in Her Second Winter Quarters



Where the Expedition Took its Magnetic Observations



Wrecked Amid Polar Snows—A Deserted Arctic Whaler the Bonanza



A Lonely Headland in Beaufort Sea



The Winter Quarters of the Amundsen Expedition



Under the Shelter of a High Arctic Headland

contradistinction to forte. **Pianissimo**, the superlative of piano.

PIANOFORTE, or **PIANO**, a musical stringed instrument, the strings of which are extended over bridges rising on the sounding-board, and are made to vibrate by means of small felted hammers, which are put in motion by keys, and where a continued sound is not intended to be produced have their sound deadened immediately after the touch of the keys by means of leathern dampers. Its name is compounded of two Italian words signifying soft and strong, and it was so called in contradistinction to the harpsichord, the instrument which it superseded, and which did not permit of the strength of the notes being increased and diminished at will. The mechanism by which the movement of the keys is conveyed to the strings is called the action, and there is no part of the pianoforte in which the variations are more numerous. There are usually three strings in the pianoforte for each note in the higher and middle octaves, two in the lower, and one in the lowest notes. The strings are of steel wire. The lowest notes have their strings wound round with a double coil of brass wire, and those next above with a single coil. Pianofortes are either in the form of the grand piano, in which the strings lie in the direction of the keys, or they have the strings stretched vertically perpendicular to the keys, which is now the most common form, and constitutes the upright piano. Recently a variety called the upright grand has also been introduced. Grand pianos are used as concert instruments, and have the greatest compass and strength. The common compass of the piano at present is six and seven-eighths or seven octaves. The invention of the pianoforte can scarcely be ascribed to any one man in particular. The first satisfactory hammer-action appears to have been invented by an Italian of Padua, named Bartolommeo Cristofali, about 1711. The instrument was not introduced into England till the latter half of the 18th century. Among the principal improvers of the pianoforte are Sebastian Erard, the founder of the celebrated firm still in existence; Roller et Blanchet, the French firm which introduced the upright piano; Broadwood, Collard, Hopkinson, Kirkman, Bechstein, Steinway, Weber, besides others.

PIAS'SABA, or **PIAS'SAVA**, a strong vegetable fibre imported from Brazil, and largely used for making brooms. It is chiefly obtained from palms. The fibre proceeds from the decaying leaves, the petioles of which separate at the base into long, coarse, pendulous fringes.

PIASTRE (pi-ás'tr), a name first applied to a Spanish coin, which, about the middle of the 16th century, obtained almost universal currency. The Spanish piastre had latterly the value of about \$1.00.

PIAZ'ZA, in architecture, is a square or other open space surrounded by buildings. The term is frequently, but improperly, used to signify an arcaded or colonnaded walk.

PICA, a size of type. See Printing.

PICA, the generic name of the magpies.

PIC'ARDY, formerly a province of

France, in the northern part of the kingdom, lying between the British Channel, Normandy, and Artois, now divided among the departments of Pas-de-Calais, Somme, Aisne, Oise, and Nord. The capital was Amiens.

PIC'COLO, a small flute having the same compass as the ordinary flute, but pitched an octave higher.

PICK'EREL, the young of the fish known as the pike. In America the name is given to some of the smaller kinds of pike.

PICKET, a military term having several meanings. Specifically it is used as describing a small body of men posted at some point beyond the general line of sentries for the purpose of observing the motions of an enemy, or giving timely notice in case of impending attack. In camp, horses are said to be picketed when secured to a picketing rope. Pegs of wood or iron used to secure tent ropes are also called pickets. In all English garrisons and camps a small body of men under a corporal or sergeant, and known as the garrison picket, patrols the lines or city as a disciplinary check on the troops, and a support to the military police.

PICKETT, George Edward, soldier, born in Richmond, Va., January 25, 1825; died in Norfolk, Va., July 30, 1875. At the beginning of the civil war he resigned from the United States army, and was commissioned colonel in the army of the Confederacy. At the battle of Gettysburg Pickett led the famous final assault on the Union lines, but, left without adequate support, his command was hurled back and almost annihilated. In May, 1864, General Pickett attacked Gen. Benjamin F. Butler's army between Richmond and Petersburg, and captured his works. At Five Forks on April 1, 1865, General Pickett's forces were surrounded and overwhelmed. After the war he returned to Richmond.

PICKLES, vegetables and certain fruits first steeped in strong brine, and then preserved in close vessels. Wood vinegar is often used, but malt or wine vinegar produces the best pickles. Owing to the corroding effects of brine and vinegar the use of metallic vessels should be avoided in making pickles. To give a green color to pickles verdigris or other poisonous compounds of copper is sometimes employed by manufacturers.

PIEDMONT, a department or territorial division of Italy, between Switzerland, Lombardy, Liguria, and France; area, 11,198 sq. miles; pop. 3,233,431.

PIER, in architecture, is the name applied to a mass of masonry between openings in a wall, such as doors, windows, etc. The solid support from which an arch springs or which sustains a tower is also called a pier. The term is also applied to a mole or jetty carried out into the sea, intended to serve as an embankment to protect vessels from the open sea, and to form a harbor.

PIERCE, Franklin, fourteenth president of the United States, was descended from an old yeoman family of New England, and was born at Hillsboro, N. H., November 23, 1804. In 1829 he was elected to the state legislature, of which

he was speaker in 1832-33. In the latter year he was chosen a member of congress and in 1837 he was elected to the senate of the United States. In 1842 he resigned his seat in the senate, and returned to the practice of the law. In 1846 he was offered the position of attorney-general of the United States, but declined it. On the outbreak of the Mexican war he joined as a volunteer one of the companies raised in Concord. He was soon after appointed colonel of the ninth regiment, and in March, 1847, brigadier-general. In 1852, as candidate of the democratic party, he was elected president of the United States by 254 electoral votes against 42 given to Gen. Winfield Scott. The special feature of



Franklin Pierce.

his inaugural address was the support of slavery in the United States, and the announcement of his determination that the Fugitive Slave Act should be strictly enforced. This was the keynote of his administration, and pregnant with vital consequences to the country. President Pierce, surrounded by an able cabinet, among them Jefferson Davis as secretary of war, firmly adhered throughout his administration to the pro-slavery party. He failed, notwithstanding, to obtain renomination, but was succeeded by James Buchanan, March 4, 1857, and retired to his home in Concord, N. H., after spending some years in Europe. During the war of 1861-65 his sympathies were wholly with the south, but, with the exception of delivering a stong speech at Concord in 1863, he took no very active part in politics. He died October 8, 1869.

PIERRE, Bernardin de Saint. See Saint-Pierre.

PIG. See Hog.

PIGEON, the common name of a group of birds. The pigeons or doves as a group have the upper mandible arched toward its apex, and of horny consistence; a second curve exists at its base where there is a cartilaginous plate or piece through which the nostrils pass. The crop is of large size. The pigeons are generally strong on the wing. They are mostly arboreal in habits, perching upon trees, and building their nests in elevated situations. Both sexes incubate; and these birds generally pair for life; the loss or death of a mate being in many cases apparently mourned and grieved over, and the survivor frequently refusing to be consoled by another mate.

The song consists of the well-known plaintive cooing. The pigeons are distributed in every quarter of the globe,



Passenger-pigeon.

but attain the greatest luxuriance of plumage in warm and tropical regions. The house-pigeons, tumblers, fan-tails, pouters, carriers, and jacobins are the chief varieties of the rock-pigeon, and have been employed by Darwin (see his



Domestic pigeon, homing variety.

Origin of Species and his Animals under Domestication) to illustrate many of the points involved in his theory of "descent by natural selection." See also Carrier Pigeon, Passenger Pigeon, Turtle-dove, etc.

PIGEON ENGLISH, conjectured to be a form of "business English," a conglomeration of English and Portuguese words wrapped in a Chinese idiom, used by English and American residents in China in their intercourse with the native traders.

PIG-IRON. See Iron.

PIGMENT-CELL, in physiology, a small cell containing coloring matter, as in the choroid coat of the eye.

PIGMENTS, materials used for imparting color, especially in painting, but also in dyeing or otherwise. The coloring substances used as paints are partly artificial and partly natural productions. They are derived principally from the mineral kingdom; and even when animal or vegetable substances are used for coloring they are nearly always united with a mineral substance (an earth or an oxide). In painting the colors are ground, and applied by means of some liquid, which dries up without changing them. The difference of the vehicle used with the method of employing it has given rise to the modes of painting in water-colors, oil-colors, in fresco, in dis-

temper, etc. For oil-painting mineral substances are more suitable than lakes prepared with minerals, because the latter become darker by being mixed with oil. The lake colors have tin or alum for their basis, and owe their tint to animal or vegetable coloring substances. Indigo is a purely vegetable color, as is also blue-black, which is obtained from burned vine-twigs. Ivory black is a purely animal color, being nothing else than burned ivory. In staining porcelain and glass the metallic colors which are not driven off by heat and are not easily changeable are used.

PIGMY. See Pygmy.

PIG-NUT. See Earth-nut.

PIKA, the calling-hare, an animal nearly allied to the hares. It is found in Russia, Siberia, and North America, and is remarkable for the manner in which it stores up its winter provision, and also for its voice, the tone of which so much resembles that of a quail as to be often mistaken for it.

PIKE, a genus of fishes. The pikes form the types of the family Esocidæ, in which group the body is lengthened, flattened on the back, and tapering abruptly toward the tail. One dorsal fin exists, this structure being placed far back on the body, and opposite the anal fin. The lower jaw projects. Teeth are present in plentiful array, and are borne by almost every bone entering into the composition of the mouth. The common pike occurs in the rivers of Europe and North America. It is fished chiefly for the sake of its flesh, which is accounted exceedingly wholesome. The pikes are very long-lived, and form the tyrants of their sphere, being the most voracious of fresh-water fishes. When fully grown the pike may attain a length of 5 or 6 feet, and there are numerous instances on record in which these fishes have greatly exceeded that length. The sea pikes also known as gar-pikes, are also included in the family Esocidæ. The saury pike resembles the gar-pike in general conformation, but possesses the dorsal and anal fins in the shape of a number of divided "finlets." The bony pike of North American lakes and rivers belongs to an entirely different order of fishes—that of the Ganoidei. See Bony Pike.

PIKE, a sort of lance, a weapon much used in the middle ages as an arm for infantry. It was from 16 to 18 feet long, and consisted of a pole with an iron point. For some time every company in the armies of Europe consisted of at least two-thirds pike-men and one-third harquebusiers. Gustavus Adolphus omitted the pike-men in some regiments entirely. The invention of the bayonet drove the pike out of use.

PIKE, Zebulon Montgomery, American soldier and explorer, was born at Lamberton, N. J., in 1779, and educated at Easton, Penn. In 1805 he engaged on an expedition to ascertain the source of the Mississippi river. The two following years were passed by him in exploring the territory of Louisiana, discovering, while thus occupied, what has since been known as "Pike's Peak," in the Rocky Mountains. Pike published the results of his expedition in *An Account of an Expedition to the Sources of the Missis-*

issippi, and *Through the Western Parts of Louisiana*, . . . and a *Tour Through the Interior Parts of New Spain*. He died in 1813.

PIKE-PERCH, a genus of fishes closely allied to the perch, but showing a resemblance to the pike in its elongated body and head. Like the pike, it is a dangerous enemy to other fresh-water fishes, but the flavor of its flesh is excellent. In Europe it occurs in two species. It also occurs in the fresh waters of North America, such as the great lakes, the upper Mississippi, and the Ohio.

PIKE'S PEAK, one of the highest summits of the Rocky mountains (14,134 feet), in the center of the state of Colorado. It was discovered by General Pike in 1806. It abounds in rich gold-bearing quartz, and has a meteorological observatory. A rack-rail line of railway, 9 miles long, to the top of the mountain has recently been constructed.

PILASTER, a square pillar projecting from a pier or a wall to the extent of from one-fourth to one-third of its breadth. Pilasters originated in Grecian



Pilaster—Corinthian.

architecture. In Roman they were sometimes tapered like columns and finished with capitals modeled after the order with which they were used.

PILATE, Pontius, the sixth Roman procurator of Judæa. He succeeded Valerius Gratus in A.D. 26. Nothing is known of his early history. He was a narrow-minded and impolitic governor, and at the very beginning of his term of office led to commotions among the Jews at Jerusalem. When Christ had been condemned to death by the Jewish priests, who had no power of inflicting capital punishments, he was carried by them to Pilate to be executed. Yielding to the clamors of the Jews the Roman governor ordered Jesus to be executed, but permitted Joseph of Arimathea to take his body and bury it. Pilate was afterward removed from his office by Vitellius, prefect of Syria (A.D. 36), and, according to tradition, was banished by Caligula to Vienna (Vienne), in Gaul, where he is said to have died or committed suicide some years after.

PILES. See Hemorrhoids.

PILGRIMAGES, the practice of making pilgrimages to places of peculiar sanctity is as ancient as it is wide-spread.

The ancient Egyptians and Syrians had privileged temples, to which worshippers came from distant parts. The chief temples of Greece and Asia Minor swarmed with strangers. But it is in Christianity and Mohammedanism that the practice has attained its greatest development. The first Christian pilgrimages were made to the graves of the martyrs. By the end of the 4th and beginning of the 5th century the custom had become so general as to lead to abuses. Throughout the middle ages, and especially about the year 1000, the religious fervor of the people manifested itself in numerous pilgrimages, especially to Jerusalem. The outrages inflicted on the Christian pilgrims by the Saracens led to the Crusades, which were themselves nothing else than gigantic armed pilgrimages. The shrine of Our Lady of Loretto, near Rome, that of St. James of Compostella in Spain, of St. Martin of Tours in France, were all sacred spots to which, from the 10th to the 13th century, and even much later, pilgrims resorted in innumerable crowds; and from the end of the 12th century the shrine of St. Thomas Becket at Canterbury had the same honor in England. After the reformation the practice of making pilgrimages fell more and more into abeyance, and the spirit which led to it seems almost to have become extinct among Christians, although there are still occasional outbursts of it among the Roman Catholics, as in the modern pilgrimages to Paray-le-Monial, Lourdes, Iona, and Holy Island. In the Greek church Mount Athos is the chief shrine of pilgrimage. For Mohammedans the great place of pilgrimage is Mecca, which was the resort of Arabian pilgrims long before the time of Mohammed. Among the Hindus and the Buddhists also the practice of performing pilgrimages largely prevails.

PILGRIM FATHERS, the name given to the English, Scotch, and Dutch non-conformists who, sailing from Southampton in the Mayflower, landed at what is now Plymouth in Massachusetts, December, 1620, and colonized New England.

PILLAR. See Column.

PIL'LORY, a frame of wood erected



Pillory.

on posts, with movable boards, and holes through which were put the head

and hands of a criminal for punishment. In this manner persons were formerly exposed to public view, and generally to public insult.

PILLS, medicines made up in globules of a convenient size for swallowing whole, the medicine being usually mixed up with some neutral substance such as bread-crumbs, hard soap, extract of liquorice, mucilage, syrup, treacle, and conserve of roses. The coverings are liquorice powder, wheat flour, fine sugar, and lycopodium. In many cases pills are now enamelled or silvered, which deprives them of most of their unpleasantness. Pills are a highly suitable form for administering medicines which operate in small doses, or which are intended to act slowly or not to act at all until they reach the lower intestines, and in some other cases.

PILOT, a person duly licensed by any piloting authority to conduct ships to which he does not belong as one of the crew. Pilots are in fact taken on board to superintend the steering of the vessel, where the navigation is difficult and dangerous, in consequence of their special knowledge of particular waters; and it is to this class alone that the term now applies, whereas in early times the pilot was the steersman, or the individual who conducted the navigation of a ship across the ocean and out of sight of land. The laws of pilotage in the United States are regulated by the individual States according to the Acts of congress.

PILOT-FISH, a genus of fishes included in the mackerel family. The pilot-fish was formerly supposed to act as a pilot to the mariner, and is still supposed to act as such to sharks. It



The pilot-fish.

often follows in the wake of ships for long distances, associating with sharks and devouring the refuse thrown overboard. The average length is about 12 inches. In general form it resembles the mackerel.

PILSEN, a town in Western Bohemia, at the confluence of the Mies and Radbusa, 53 miles southwest of Prague. The chief article of manufacture and commerce is beer. Coal, iron, alum, etc., are worked in the neighborhood. Pop. 68,292.

PIN, a piece of wire, generally brass, sharp at one end and with a head at the other, chiefly used by women in adjusting their dress. By the old methods of manufacture by hand, the distinct processes, from the straightening of the wire to the spinning and hammering of the head, were usually said to be fourteen. At present all those processes, from the cutting of the wire to the sticking of the pins into papers, are performed by machinery. Pins came into common use in England in the 15th century. In the 17th century Birmingham became the seat of the pin-manufacture, and has continued to be so ever since. Solid-

headed pins, which are those now generally in use, were first made in 1824.

PINAR' DEL RIO, a town of Cuba, 90 miles southwest of Havana, in the famous Vuelta de Abajo, where the best tobacco grows. Pop. 10,180.

PINDAR, the greatest of the lyric poets of Greece, born in Bœotia, in or near Thebes, of a noble family, about 522 B.C. Little is known with certainty of his life; even the date of his death is doubtful. The most probable account appears to be that he died at the age of eighty, in which case his death would fall about 442 B.C. He practiced all kinds of lyric poetry, and excelled equally in all. His works embraced hymns to the gods, pæans, dithyrambs, dancing and drinking songs, dirges, panegyrics on princes, and odes in honor of the victors in the great Grecian games, but the only poems of his which have come down to us entire belong to the last class, the Epinicia. Forty-five of the epinician odes of Pindar are still extant. Fourteen of these are in celebration of Olympic victors, twelve of Pythian, eleven of Nemean, and eight of Isthmian.

PINE, the popular name of trees of the genus, *Pinus*, natural order Coniferæ, which is divided into two sub-orders, namely, 1. the fir tribe; and 2. the cypress tribe. The pines belong to the former section, and are distinguished from the spruce, larch, fir, cedar, etc., chiefly by having persistent leaves in clusters of two to five in the axils of membranous scales. All the European species, except one have only two leaves in a sheath; most of the Asiatic, Mexican, and Californian kinds have three, four, or five leaves, and those of the United States and Canada have generally three. There are extensive forests of it in Russia, Poland, Sweden, Norway, Germany, the Alps, the Pyrenees, and the Vosges. The Corsican pine grows to a height of from 80 to 100 feet, and in the island of Corsica it is said to reach an altitude of 140 to 150 feet. Sabine's pine was discovered in California in 1826. The leaves are in threes, rarely in fours, from 11 to 14 inches long; the trees are of a tapering form, straight, and from 40 to 120 feet high, with trunks from 3 to 12 feet in diameter. The Cembran pine is a native of Switzerland and Siberia. The red Canadian pine, or yellow pine, inhabits the whole of Canada from the Atlantic to the Pacific, and is also found in the northern and eastern parts of the United States. The trunk rises to the height of 70 or 80 feet by about 2 in diameter at the base, and is chiefly remarkable for its uniform size for two-thirds of its length. The wood is yellowish, compact, fine-grained, resinous, and durable. The true yellow pine rises to the height of 50 or 60 feet, by 15 or 18 inches in diameter at base. The cones are small, oval, and armed with fine spines. The timber is largely used in shipbuilding and for house timber. The other American pines are the Jersey pine, the trunk of which is too small to be of any utility in the arts; the pitch pine, which is most abundant along the Atlantic coast, and the wood of which, when the tree grows in a dry, gravelly soil, is compact, heavy, and

contains a large proportion of resin; the loblolly pine, the timber of which decays speedily on being exposed to the air; the long-leaved pine, which abounds in the lower part of the Carolinas, Georgia, and Florida, furnishing resin, tar, pitch, and turpentine, and timber which is hardly inferior to the white oak in naval architecture; the Weymouth pine, the timber of which, though not without essential defects, is consumed in much greater quantities, and for a far greater variety of purposes, than almost any other; and Lambert's pine, which grows between the fortieth and forty-third parallels of latitude, and about 100 miles from the Pacific. It is of gigantic size, the trunk rising from 150 to upward of 200 feet, and being from 7 to nearly 20 feet in diameter.

PINEAL GLAND, in anatomy, is a body (not properly a gland) forming part of the brain. It is about the size of a pea, and is connected with the cerebrum at its base by four peduncles or stalks and by some few cross fibers. Its use is not known. It was considered by the ancients to be the seat of the soul.

PINE-APPLE, a plant belonging to the natural order Bromeliaceæ, much esteemed for its richly-flavored fruit, which somewhat resembles a pine-cone. A native of tropical America, it is now naturalized in many hot countries, and is also cultivated in hothouses. The common pine-apple plant yields the fiber of which, in Manila, the beautiful pina cloth is made. The fiber is also used for textile purposes in China, and to some extent in India, and it is believed that in the latter country the fiber might soon come to be an article of commercial importance.

PINE BLUFF, the capital of Jefferson co., Ark., on the Arkansas river at the head of low-water navigation, and on the St. L., Iron Mount. and South., and the St. L. S. West. railways; 42 miles s.e. of Little Rock. It is built on a bluff 228 feet above sea-level in the cotton-producing region of the state. Pop. 13,740.

PINES, ISLE OF, an island of the West Indies; 35 miles s. of the western end of Cuba. The island is a dependency of Cuba, contains 1214 sq. miles of undulating or flat and marshy land, and has about 5000 inhabitants. Capital and principal village, Nueva-Gerona. The island contains marble quarries, and is a favorite health resort for sufferers from lung diseases.

PIN'ERO, Arthur Wing, English dramatist, was born in London in 1855. He made his appearance as an actor at Edinburgh in 1874. He obtained under Henry Irving a practical experience in stagecraft which was of great value to him. In 1876 he made, with Two Can Play at That Game, his first attempt at play-writing, to which after 1881 he devoted himself. In the long list of his plays are: The Money Spinner, the Schoolmistress, the Hobby Horse, Sweet Lavender, The Weaker Sex, The Profligate, Lady Bountiful, The Second Mrs. Tanqueray, The Notorious Mrs. Ebb-smith, Trelawney of the "Wells", The Gay Lord Quex, Iris. Of his earlier pieces the most popular was the domestic drama called Sweet Lavender.

PINION, in machinery, a small wheel

which plays in the teeth of a larger one, or sometimes only an arbor or spindle in the body of which are several notches forming teeth or leaves, which catch the teeth of a wheel that serves to turn it round.

PINK, a genus of plants. More than 100 species are known. Their roots are annual or perennial; the stems herbaceous and jointed; the leaves opposite and entire, and the flowers terminal, aggregate, or solitary, and always beautiful. The clove pink or carnation, and the garden pink, of which there are many varieties, are familiar species.

PINNACLE, in architecture, any lesser structure that rises above the roof of a building, or that caps and terminates the higher parts of angles or of buttresses. The application of the term is now generally limited to an ornamental pointed mass rising from angles, but-



Pinnacle, Trinity church, Cambridge.

tresses, or parapets, and usually adorned with rich and varied devices. They are usually square in plan, but are sometimes octagonal, and in a few instances hexagonal and pentagonal. The tops are generally crocketed, and have finials on the points.

PINNATE, in botany, formed like a feather. A pinnate leaf is a species of compound leaf wherein a single petiole has several leaflets or pinnules attached to each side of it.

PINT, a measure of capacity used for both liquids and dry goods; it is the eighth part of a gallon, or 34.65925 cubic inches.

PINZON', a family of Spanish navigators, natives of Palos, who were associated with Columbus in the discovery of America.—Martin Alfonso, the eldest, was of great assistance to Columbus in fitting out his fleet, and in the voyage commanded the Pinta.—Vicente Yañez, his brother, commanded the Niña in the first voyage of Columbus.—Francisco Martin, the third brother, was pilot of the Pinta in the first voyage of Columbus. From him descended the noble Spanish family of Pinzon.

PIOTRKOV, a town of Russian Poland in the government of same name, one of the oldest towns of Poland. It was at one time the seat of the Polish diet, and the kings were elected here. Pop. 30,372.—The government has an area of 4729 sq. miles. It is moderately fertile, and

has considerable manufactures of cottons and woollens. Pop. 1,409,044.

PIPA, a genus of toads, of which the best known species is of Surinam and Brazil, popularly designated the Surinam toad. The tongue and teeth are wanting in this family. The pipa is one of the most repulsive looking of the toads, and is noted as exemplifying, in the case of the female animals, an anomalous mode of developing the eggs and young. A number of pits or depressions termed "dorsal cells" appear to be



Surinam toad.

formed on the back of the female pipas at the breeding season. In each cell an egg is deposited, the eggs being first deposited by the female in water after the usual method, and being impregnated by the male, who then collects the eggs and places them in the female's back. Each cell appears to be closed by a lid-like fold, and within the cells the eggs are hatched and the young pass their tadpole state.

PIPE, a tube for the conveyance of water, steam, gas, or other fluid, used for a great variety of purposes in the arts and in domestic economy. The materials of which pipes are made are also very various, wood, stone, earthenware, iron, lead, copper, leather, gutta-percha, etc., being all employed. Drainage and sewerage pipes of great strength and size (measuring from 1 to 2 up to 54 inches in diameter) are now usually made of fire-clay, glazed on their outer and inner surfaces. Large iron pipes are usually cast, and are used for the supply of water and gas.

PIPE, tobacco, a bowl and connecting tube, made of baked clay, wood, stone, or other material, and used in smoking tobacco. The cheap pipes in common use are made of a fine-grain white plastic clay. The chief processes in the manufacture of clay pipes are moulding and baking. Finer and more expensive pipes are made of meerschau, a somewhat plastic magnesian stone of a soft greasy feel. Meerschau pipe making is carried on to the greatest extent by the Germans, and Vienna may be said to be the center of the manufacture. Briar-root pipes, with the bowl and stem of one piece of wood, and provided with amber, ivory, or bone mouthpieces, are now very common. They are made of the roots of a large variety of heath. Many Germans and Dutchmen prefer pipes with porcelain bowls, which are sometimes beautifully painted in the style of fine chinaware painting. The eastern hookah is a pipe of great size, the bowl of which is set upon an air-tight vessel partially filled with water, and has a

small tube which passes down into the water; the long flexible smoking-tube is inserted in the side of the vessel, and the smoke is made to pass through the water, being thus cooled and deprived of some noxious properties. Upon the American continent pipes have been in use from a very remote period. Indian pipes, with elaborately-carved soap-stone bowls and ornamented wooden stems, or entirely of baked clay, have been found in the ancient mounds of the west, together with other relics of an unknown race. See Calumet.

PIPE-CLAY, a fine white clay which is used for making tobacco pipes and articles of pottery, also for cleaning soldiers' belts, etc.

PIPE-FISHES, a genus of fishes nearly allied to the curious little fishes popularly known as "sea-horses." They are distinguished by a long and tapering body, and by jaws united to form a tube or pipe, bearing the mouth as the tip. It averages 20 inches in length. A very



Great pipe-fish.

remarkable circumstance in connection with the pipe-fishes consists in the males of some species possessing a pouch-like fold, situated at the base of the tail, in which the eggs are contained after being extruded from the body of the females, and in which the young, after hatching, continue to reside for a time.

PIPPIN, the name given to a certain class of apples, probably because the trees were raised from the pips or seeds, and bore the apples which gave them celebrity without grafting. The Ribston, Golden, and Newton Pippin are favorite varieties.

PIQUA, town in Miami co., Ohio, on Miami river, and Miami and Erie canal, 90 miles northeast of Cincinnati. Pop. 14,280.

PIQUET, a game at cards played between two persons with thirty-two cards, all the plain cards below seven being thrown aside. In playing, the cards rank in order as follows: the ace (which counts eleven), the king, queen, and knave (each of which counts ten), and the plain cards, each of which counts according to the number of its pips. The player who first reaches 100 has the game. The score is made up by reckoning in the following manner:—Carte blanche, the point, the sequence, the quatorze, the cards, and the capot.

PIQUE-WORK, a fine kind of inlaid work, resembling Buhl-work, but much more expensive and elaborate, the inlay being minute pieces of gold, silver, and other costly materials.

PIRACY is the crime of robbery and depredation committed upon the high seas. It is an offense against the universal law of society. In England the offense was formerly cognizable only by the admiralty courts, which proceeded without a jury, in a method founded upon the civil law; but now any justices of assize, or oyer and terminer, or jail

delivery, may try persons accused of piracy. Piracy, in the common sense of the word, is distinguished from privateering by the circumstance that the pirate sails without any commission, and under no national flag, and attacks the subjects of all nations alike; the privateer acts under a commission from a belligerent power, which authorizes him to attack, plunder, and destroy the vessels which he may encounter belonging to the hostile state.

PISA, a town of Northern Italy, capital of the province of the same name. In the northwest part of the city is a remarkable group of buildings consisting of the Duomo or Cathedral, the Baptistery, the famous "Leaning Tower," and the Campo Santo. The manufactures consist chiefly of silk, woolen, and cotton goods. The population, which reached 150,000 when the city was in its zenith, is now 61,279. The province of Pisa has an area of 1180 sq. miles, and a population of 320,829. See Leaning Tower.

PISCES, or **FISHES**. See Ichthyology.

PISCES (the Fishes), a sign of the zodiac, which is entered by the sun about the 19th of February. The constellation which occupies the zodiacal region corresponding to the sign has the same name; it contains some interesting double stars.

PISCICULTURE, the breeding, rearing, preservation, feeding, and fattening of fish by artificial means. Pisciculture has been practiced from very remote ages, having been in use in ancient Egypt, and followed in China in early times on a very large scale. The art, so far as the perfecting of natural conditions under which fish live and thrive, without interfering directly with the ordinary processes of nature, has thus always been more or less practiced. But the discovery that the ova of fish can be taken from the body of the female parent, impregnated with the male milt and hatched in tanks, has led to a great extension of the art. One great point in modern pisciculture is the propagation and rearing of young fish in artificial ponds with the view of introducing fish into some locality where they were not previously found. Salmon and trout ova have been sent from Britain, and successfully propagated in Australia and New Zealand. The art has now come into general favor and is widely followed, very many rivers having on their banks breeding and rearing establishments for the purpose of increasing the stock of fish in the streams. In Scotland a very successful effort has been carried out at Stormontfield, near Perth, on the Tay, and there is a still more famous piscicultural establishment belonging to Sir James Gibson Maitland at Howietoun, near Stirling. The Midlands Counties' Fish Culture Establishment at Malvern Wells is the largest in England. From Huningue, near Basel, on the Rhine, millions of ova are annually despatched to England, Germany, Spain, and other countries. The American Fish and Fisheries Commission have successfully introduced into various waters the American white fish, the Californian trout, the American brook char,

etc., and pisciculture on a large scale is practiced both in the United States and Canada. The artificial culture of oysters, mussels, lobsters, and other crustacea, is also receiving attention; and altogether the art is every year attaining a greater development, and promises to become yet an important department of commercial industry.

PISIS'TRATUS, "tyrant" of Athens, was descended from Codrus, the last king of Athens, and was born not later than 612 B.C. He was rich, handsome, and eloquent, and being by nature ambitious he soon placed himself at the head of one of the three parties into which Attica was then divided. By putting himself forward as the patron and benefactor of the poor, and by advocating civil equality and a democratic constitution, he was able (notwithstanding the opposition of Solon) to seize upon the acropolis (citadel) in 560 B.C., and thus to make himself master, or, as the Greeks termed it, "tyrant" of the city. But though a tyrant in the Greek sense, his use of power was by no means tyrannical. He made no attempt to abolish the wise laws of Solon, but confirmed and extended their authority. He was, however, twice driven from Athens; but in the eleventh year of his second banishment succeeded in making himself master of the sovereignty for the third time. Pisistratus erected splendid public buildings at Athens, established a public library, and collected and arranged the poems of Homer, and conducted himself with so much prudence and clemency that his country scarcely ever enjoyed a longer term of peace and prosperity. He died 527 B.C., leaving two sons, Hippias and Hipparchus, to inherit his power, who were not, however, able to preserve it.

PISTACHIO (pis-tā'shi-o), a tree of several species, growing to the height of 15 to 20 feet. It yields the well-known pistachio-nut, which contains a kernel



Pistachio.

of a pleasant taste, resembling that of the almond, wholesome and nutritive, yielding a pleasant oil. It is a native of western Asia.

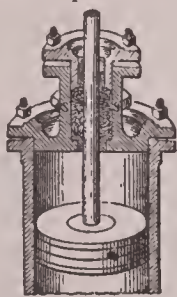
PISTIL, in botany, the female or central seed-bearing organ of a phanerogamous flower, consisting of one or more carpels or modified leaves. There may be only a single pistil or several in the same flower. It consists essentially of two parts, the ovary, containing the ovules or young seeds, and the stigma,

a cellular secreting body, which is either seated immediately on the ovary (as in the tulip and poppy), and is then called sessile, or is borne on a stalk called a style interposed between the ovary and stigma. It is on the stigma that the pollen falls by which the fecundation takes place, after which the ovule develops into the seed.

PISTOL, a small firearm with a curved stock, discharged with one hand, named from the town of Pistoja, where they were first made. Pistols were introduced into England in 1521. Mention is made of their use in 1544. The "dag" mentioned by the Elizabethan writers was a kind of clumsy pistol. Pistols are made of various sizes, ranging from 6 inches to 18 and even 24 inches (the holster pistol). See Firearms, Revolver.

PISTOLE (pis-tôl'), a gold coin met with in several parts of Europe, more especially in Spain, value about \$4.00, but not now coined. It was originally a Spanish coin, and was equivalent to a quarter of a doubloon.

PISTON, in machinery, a movable piece, generally of a cylindrical form, so fitted as to occupy the sectional area of a tube, such as the barrel of a pump or the cylinder of a steam-engine, and capable of being driven alternately in two directions by pressure on either of its sides. One of its sides is fitted to a rod, called the piston-rod, which it



Piston and cylinder.

either moves backward and forward, as in the steam-engine, where the motion given to the piston-rod is communicated to the machinery, or by which the piston is itself made to move, as in the pump. The piston is usually made to fit tightly by some kind of material used as packing, the piston-rod being also made similarly tight by material closely packed in the stuffing-box (s s).

PITCAIRN ISLAND, an island in the South Pacific, belonging to the Low Archipelago, lat. 25° 5' s.; lon. 130° 5' w.; length, 2½ miles; breadth, about 1 mile. It was discovered by Carteret in 1767. Its coast is almost perpendicular throughout its whole extent, fringed with formidable rocks and reefs, accessible only at two points, and not at all in stormy weather. It rises to the height of 1100 feet, and the soil, naturally fertile, yields good pasture, potatoes, yams, plantain and bread-fruit, pine-apples, and other tropical fruits. In 1881 the inhabitants numbered 96, and in 1901, 126. Whalers and trading vessels occasionally call and exchange the products of civilization for the produce of the island.

PITCH, the residuum obtained by boiling tar till the volatile matter is

driven off. It is extensively used for caulking the seams of ships, for preserving wood and iron-work from the effects of water, for making artificial asphalt, etc.

PITCH, the acuteness or gravity of any particular musical sound, which is determined by the number of air-vibrations in a given time—the greater the number the higher the note. In stringed instruments the pitch is dependent on the length, thickness, and degree of tension of the string; in wind instruments, such as the flute or organ, chiefly on the length of the column of air set in motion. (See Music.) The tuning-fork is in common use to assist in giving some desired pitch.

PITCH-BLENDE, a mineral composed of 86.5 oxide of uranium, 2.5 black oxide of iron, galena and silex. In color it varies from brown to black, and occurs globular, reniform, massive, disseminated, and pulverulent. It generally accompanies uranite.

PITCHER-PLANT, a name given to several plants from their pitcher-shaped leaves, the best known of which is a



Pitcher-plant.

native of China and the East Indies. It is a herbaceous perennial, and grows in marshy situations. The leaves are sessile, oblong, and terminated at the extremities by a cylindrical hollow vessel resembling a common water-pitcher, which contains a fluid secreted by the plant itself. This pitcher is furnished with a lid which generally opens in the day and shuts at night, and which is regarded as the true blade of the leaf. Wonderful curative powers are ascribed to the fluid in the pitcher and to the leaf and the root of this plant by the natives of the East Indies and Madagascar.

PITCH-PINE. See Pine.

PITH, the cylindrical or angular column of cellular tissue at or near the center of the stem of a plant, also called the medulla. It is not usually continued into the root, but is always directly connected with the terminal bud of the stem; and in the first instance also by means of the medullary rays with the lateral leaf-buds. When examined microscopically it presents in section a union of cells resembling those of a honeycomb, of which a good example is afforded by Chinese rice-paper, the pith of the *Aralia papyrifera*. The pith is at first succulent and of a greenish color, afterward it becomes dry, and in many plants its cells are broken up, leaving large cavities. In its primary state it appears to be a reservoir of nourishment for the embryo plant

PITT, Earl of Chatham. See Chatham (William Pitt, Earl of).

PITT, William, second son of the Earl of Chatham, born May 28, 1759; died January 23, 1806. He possessed a remarkably precocious intellect, but his physical powers were weak. He was educated privately till his fourteenth year, when he entered Cambridge. He was called to the bar in 1780, and entered parliament the following year as member for Appleby. His success in the house was of unparalleled rapidity. He supported Burke's financial reform bill, and spoke in favor of parliamentary reform; became chancellor of the exchequer at twenty-three, under the Earl of Shelburne, and in the following year attained the position of prime minister. Although strongly supported by the sovereign, he stood opposed to a large majority of the House of Commons and a dissolution took place in March 1786. At the general election which followed the voice of the nation appeared decidedly in his favor, and some of the strongest aristocratical interests in the country were defeated, Pitt himself being returned by the University of Cambridge. His first measure was the passing of his India bill, establishing the board of control, which was followed by much of that fiscal and financial regulation that gave so much éclat to the early period of his administration. The establishment of the delusive scheme of a sinking fund followed in 1786, and his Regency bill in 1788. The French revolution now broke out, and in 1793 war arose between Great Britain and France, a conflict which brought a heavy responsibility on Pitt, and immense sacrifices and burdens on his country. In 1800 the Irish union was accomplished. In 1801 the opposition of the king to all further concession to the Irish Catholics caused Pitt to resign his post. The Peace of Amiens succeeded



William Pitt.—From the statue by Chantrey.

and the Addington administration, which concluded it, Pitt supported for a time, and then joined the opposition. The new minister, who had renewed the war, unable to maintain his ground, resigned; and in 1804 Pitt resumed his post at the treasury. Returning to power as a war minister, he exerted all the energy of his character to render the contest successful, and found means to engage the two great military powers of Russia and Austria, in a new coalition, which was dissolved by the battle of

Austerlitz. This event he did not survive long; his constitution, weakened by hereditary gout, rapidly yielded to the joint attack of disease and anxiety.

PITTSBURG, a city in Allegheny co., Pennsylvania, in the angle between the Monongahela and the Allegheny rivers where they unite to form the Ohio. It is admirably situated for trade, having ample river and railway connection with the great commercial emporiums of the east, west, and south, while in the neighborhood there are immense and cheaply-obtainable coal supplies. These exceptional advantages have made Pittsburgh the chief center of the American iron and steel industry; smelting furnaces, foundries, rolling-mills, etc., being numerous and on a large scale. The glass manufactures of Pittsburgh also rank first in importance in the United States; cotton goods, leather, earthenware, white lead, soda, tobacco, beer and spirits are largely produced; but the chief exports are iron and steel, hardware and machinery, glass, coal, and coke. Pittsburgh consists of the town proper and of several large suburbs, and with those that are on the opposite side of the rivers the connection is kept up by twelve bridges, comprising some very excellent examples on the suspension principle. Of the adjacent places, which, though separately incorporated, are properly regarded as only suburbs of Pittsburgh, the most important are Allegheny on the right bank of the Allegheny river, a favorite residence with the wealthier classes, and Braddock on the right bank of the Monongahela to the east of the city. Both Pittsburgh and Allegheny possess many fine public buildings and institutions. Natural gas is extensively employed for both lighting and heating purposes. Pittsburgh occupies the site of a fort called Du Quesne, built by the French in 1754; captured by the British in 1758, and named after William Pitt. It was chartered in 1816, but since then its boundaries have been several times extended. On November 18, 1907, the Supreme Court of the United States declared the act consolidating the cities of Pittsburgh and Allegheny valid. The consolidation gives the city an area of thirty-eight square miles, and an estimated population in 1909, 565,000. It will outrank Cleveland and Baltimore, giving Boston a close race for fifth place in size, and will have the largest tonnage of any city in the world.

The officials in Allegheny will at once become deputies to those in Pittsburgh until the next election, which is in 1909.

PITTSBURG, a city in Crawford co., Kan., on the Atch., Top. and S. Fé, the Kan. City, Ft. Scott and Mem., the Kan. City, Pitts. and Gulf, the Mo. Pac., and the St. L. and San. Fran. railways; 10 miles s.e. of Girard, the county seat. It is in a coal mining region. Pop. 12,224.

PITTSFIELD, a city of Massachusetts, on the Housatonic, which is here formed by the waters from several lakes. It is well built, manufactures extensively cotton and woolen goods, silk, castings, machinery, tools, paper, boots and shoes, brewery products, etc., and owing to its

salubrious climate and fine scenery is a favorite summer resort. Pop. 25,875.

PITTSTON, a town in Pennsylvania, 9 miles from Wilkesbarre, in an important coal district. Pop. 14,670.

PIUS II. (Æneas Sylvius Piccolomini), pope, born 1405, died 1464. He became secretary to Cardinal Capranica, and the Council of Basel in 1431; to the anti-pope Felix V. in 1439, and to Frederick III. of Germany in 1442. He succeeded Calixtus III. as pontiff 1458. Pius II. was one of the most learned men of his age, and left some valuable and interesting historical works, orations, and letters.

PIUS V. (Michele Giuslieri), pope, born in 1504, died 1572. He was raised to the cardinalate by Paul IV. in 1557, appointed inquisitor in Lombardy, then inquisitor-general, and chosen pope in 1565. He chiefly distinguished himself by his cruel persecutions of Protestants and Jews. In 1570 he excommunicated Elizabeth of England.

PIUS VI. (Giovanni Angelo Braschi), pope, born at Cesena 1717, died at Valence 1799. He held important offices under several pontiffs, was raised to the cardinalate by Clement XIV., and succeeded him in 1775.

PIUS VII. (Gregorio Barnaba Chiaramonti), pope, born at Cesena in 1742, died 1823. Pius VI. created him bishop of Tivoli, cardinal and bishop of Imola; and his friendly attitude toward the Cisalpine republic secured him the favor of France, and the election to the papal chair in 1800.

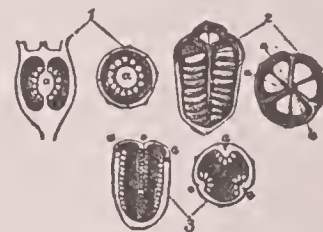
PIUS IX. (Giovanni Maria Mastai-Ferretti), pope, born in 1792, was destined for a military career, and on the restoration of Pius VII. entered the Guardia Nobile of the Vatican, but soon after adopted the clerical profession. He held various ecclesiastical offices under Leo XII., who appointed him archbishop of Spoleto in 1827, and to the see of Imola in 1832. Although raised to the cardinalate in 1840, he resided in his diocese until his election to the pontificate in 1846. The immaculate conception of the Virgin was settled by a papal decree in 1854, and the dogma of papal infallibility was established by the ecumenical council of 1870. By this time the pope's dominions had been greatly reduced, and what remained of the temporal power was secured by the presence of French troops at Rome. But the downfall of Napoleon III. caused their withdrawal; the Italian troops took possession, and the political rule of the holy see was at an end. The Vatican was left to the pope, and his independence ensured. Free diplomatic intercourse, the honors due to a sovereign, and a civil list of \$650,000 yearly, were secured to him. But these he declined, and year after year he confined himself to the Vatican and its garden, declaring that he was under restraint, and a prisoner in his own palace. His death took place in February, 1878.

PIZARRO, Francisco, Spanish adventurer, the discoverer and conqueror of Peru, was born in 1478, the illegitimate son of a hidalgo, and was first a swineherd and then a soldier. The spirit of adventure which at that time pervaded Spain, prompted him to seek

fortune in the newly-found continent of America, where he participated in various military and trading expedition. While resident near Panamá he became associated with two other adventurers, Hernando Luegue, or de Luegues, and Diego de Almagro. In 1524 they jointly fitted out an expedition with a view to exploration and conquest, and on their second voyage discovered Peru; but finding their force inadequate for conquering the country, Pizarro returned to Spain for assistance. He arrived in Seville in 1528, was granted the necessary powers and a small force, and recrossed the Atlantic in 1531. The following year he arrived in Peru during a civil war, treacherously seized the person of the reigning inca at a friendly banquet, and after extorting an immense ransom put him to death. The whole empire was gradually conquered without much opposition, but its settlement was long in abeyance owing to a feud between Pizarro and Almagro. Hernando Pizarro, a brother of the general strangled Almagro in 1537. This act was avenged in 1541 when a son of Almagro murdered Francisco Pizarro in his palace at Lima. Lima was founded by Pizarro in 1535, and his remains are interred in the cathedral of that city, also founded by him.

PLACE, La. See Laplace.

PLACENTA, the structure which, in the higher mammalia, connects the foetus, or unborn embryo, with the circulation of the mother, thus providing for its due nutrition. In its most typical form it is only met with in the higher mammalia, which are therefore called placental mammals, while the lower mammalia are termed implantal or aplacental, from their wanting a placenta; the latter include only the two orders Monotremata and Marsupialia. Certain analogous structures also exist in connection with the development of



Transverse and vertical sections to show placenta. 1, central placenta; 2, axile central placenta; 3, parietal placenta; aa, placenta.

the young of some species of sharks and dog-fishes. The human placenta presents the most perfect type, and is a special growth on the part both of the womb and the ovum. By the end of pregnancy it forms a disc-like mass, measuring $7\frac{1}{2}$ inches across, $\frac{3}{4}$ inch thick, and about 20 oz. in weight. Connected with it near the middle is the umbilical cord, by means of which the growing embryo is attached to the placenta. Through the placenta and the umbilical cord the blood of the embryo comes into close communication with the blood of the mother, by means of which its purity and nourishing qualities are maintained, and the requisite supply of material furnished for the embryo's continued life and growth. At the end of

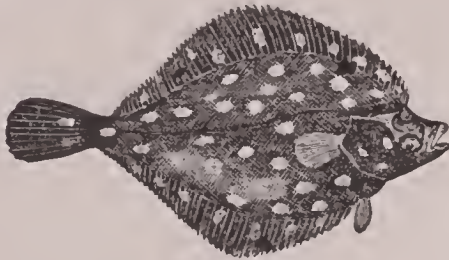
pregnancy the placenta is thrown off as the after-birth, after the child itself has been expelled.

PLACENTA, in botany, a development of cellular tissue at the inner or ventral suture of a carpel, to which the ovules or seeds are attached either immediately or by umbilical cords, as in the pod of the pea. The placenta is formed on each margin of the carpel, and is therefore essentially double. When the pistil is formed by one carpel the inner margins unite in the axis, and usually form a common placenta. When the pistil is composed of several carpels there are generally separate placentas at each of their margins. The term parietal placenta is applied to one not projecting far inward, or one essentially constituted of the wall of the seed-vessel. The form of placentation forms an important distinction between the various orders of plants.

PLAGUE, a contagious and very fatal febrile disease characterized by entire prostration of strength, stupor, delirium, often nausea and vomiting, and certain local symptoms, as buboes, carbuncles, and livid spots (petechiæ). Like all other malignant fevers the plague has its various stages, but most frequently runs its course in three days, although death may ensue a few hours after its appearance. If the patient survive the fifth day, he will, under judicious treatment, generally recover. It is now almost universally admitted that the plague is a specific disease, and that it is the result of a miasmatic poison. It is also well established that unfavorable climatic influences, such as heat and humidity combined, faulty sanitary conditions, inadequate air, light, water, and food, favor its spread when once introduced. There is no specific remedy against the disease, and a variety of treatment has been adopted on different occasions and by different medical men. The plague appeared in the most ancient times, although historians have used the term indiscriminately for other epidemics. The first recorded visitation of the plague to Europe is that at Athens (430 B.C.), described by Thucydides; Josephus relates that of Jerusalem A.D. 72. Among the most disastrous plagues of antiquity are those of Rome in 262, when 5000 persons are said to have died daily; and of Constantinople in 544. From the latter part of the 6th to the 12th century, it ravaged at intervals various parts of Europe, particularly France and Germany. In the 13th century it was brought to modern Europe by the Crusaders, and from 1347 to 1350 it traversed all Europe, and was then called the black death. The scourge again claimed its victims in the succeeding centuries, and in 1593 it was brought to England by an army returning from the continent. Before the true nature of the disease became known it had gained a firm footing in London, and there were 11,503 deaths. London lost by the plague 36,269 lives in 1603; 35,500 in 1625; 13,480 in 1636; and 68,600 in 1665. The plague in Marseilles in 1720 caused the death of over 60,000 in seven months, and in Messina (1743) of 43,000 in three months. In 1771 it nearly swept off the whole popu-

lation of Moscow. Subsequently it appeared locally in Europe at a number of points. In 1878-79 it caused many deaths on the Lower Volga; but the most severe recent visitation was in India, in 1896-99, and subsequently, even in 1902.

PLAICE, a genus of so-called "Flat-fishes." The common plaice, a well-known food fish, attains an average length of 12 or 18 inches. The dark or upper side is colored brown, spotted with red or orange; the body is comparatively smooth; the ventral fins are situated on the throat, and are thus



The plaice.

jugular in position; the mouth is of small size, and provided with small teeth. These fishes are all "ground-fishes," that is, feed and swim near the bottom of the sea. They are caught chiefly by means of trawl-nets.

PLAIN, a tract of country of nearly uniform elevation. Plains receive a variety of names in different countries, as steppes in Russia and Asia; savannas, prairies, pampas, etc., in America. Elevated plains are called plateaus or table-lands.

PLAINFIELD, a city in Union co., N. J., on Green Brook, and the Central railroad of N. J.; 11 miles n. of New Brunswick, 24 miles w.s.w. of New York City. The principal industries are the manufacture of printing-presses, oil-cloth, carpets, and machine tools. Pop. 18,267.

PLAINTIFF, in English law, the person who commences a suit against another in law or equity.

PLAN, in architecture, a drawing showing the design of a building, a term chiefly used in reference to horizontal sections showing the disposition of the walls and various floors of the building, and of the doors and windows, etc.; but also applied to elevations and vertical sections. A geometrical plan is one wherein the several parts are represented in their true proportions. A perspective plan is one, the lines of which follow the rules of perspective, thus reducing the sizes of the more distant parts. The term is also applied to the draught or representation on paper of any projected work, as the plan of a city or of a harbor.

PLANE, a joiner's tool, consisting of a smooth-soled solid block, through which passes obliquely a piece of edged steel forming a kind of chisel, used in paring or smoothing boards or wood of any kind. Planes are of various kinds, as the jack-plane (about 17 inches long), used for taking off the roughest and most prominent parts of the wood; the trying-plane, which is used after the jack-plane; the smoothing-plane (7½ inches long) and block-plane (12 inches

long), chiefly used for cleaning off finished work, and giving the utmost degree of smoothness to the surface of the wood; the compass-plane, which has its under surface convex, its use being to form a concave cylindrical surface. There is also a species of plane called a rebate-plane, being chiefly used for making rebates. The plough is a plane for sinking a channel or groove in a surface, not close to the edge of it. Moulding-planes are for forming mouldings, and must vary according to the design. Planes are also used for smoothing metal, and are wrought by machinery. See Planing Machine.

PLANE, in geometry, a surface such that if any two points in it are joined by a straight line the line will lie wholly within the surface.

PLANE, Inclined. See Inclined Plane.

PLANE-TREE, a genus of trees, the American plane-tree or button-wood (the sycamore or cotton-tree of the West), abounds in American forests, and on the banks of the Ohio attains sometimes a diameter of from 10 to 14 feet, rising 60 or 70 feet without a branch. The bark is pale-green and smooth, and its epidermis detaches in portions; the fresh roots are a beautiful red; the leaves are alternate, palmated, or lobed; and the flowers are united in little globular, pendent balls. The wood in seasoning takes a dull red color, is fine-grained, and susceptible of a good



Oriental plane-tree.

polish, but speedily decays on exposure to the weather. The oriental plane resembles the preceding, and is plentiful in the forests of Western Asia.

PLANET, a celestial body which revolves about the sun as its center (primary planets), or a body revolving about another planet as its center (secondary planets, satellites, or moons). The known major planets are, in the order of their proximity to the sun, Mercury, Venus, the Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. Mercury, Venus, Mars, Jupiter, and Saturn were known to the ancients. Uranus was accidentally discovered by Herschel in 1781, while the discovery of Neptune was the result of pure intellectual work, the calculating of Leverrier and Adams (1845). The planetoids or asteroids are small bodies discovered since the beginning of the nineteenth century between the orbits of Mars and Jupiter. The number of these asteroids is annually increased by fresh discoveries; over 400 are now known. Mercury, Venus, the Earth, and Mars closely resemble

PLANT

each other in many respects. They are all of moderate size, with great densities; the earth weighing as much as five and a half times an equal bulk of water. They shine only by reflected sunlight. Jupiter, Saturn, Uranus, and Neptune, on the other hand, are of enormous size, of small densities, some of them weighing less than an equal bulk of water, and probably exist at a high temperature, and give out in addition to reflected sunlight a considerable amount of light and heat of their own. The most colossal of the planets is Jupiter; its volume exceeds that of the earth about 1200 times. Saturn is next in size. Mars, Jupiter, Saturn, Uranus, and Neptune, being outside the earth's orbit, are sometimes called the superior planets; Venus and Mercury being within the earth's orbit, are called inferior planets. The family of major planets has also been subdivided into intra-asteroidal planets—Mercury, Venus, the Earth, Mars; and extra-asteroidal planets—Jupiter, Saturn, Uranus, and Neptune, the character of the two being very different as above described. The planet which approaches nearest to the earth is Venus, the least distance in round numbers being 23 millions of miles; the most distant is Neptune, least distance 2629 million miles. We give here a comparative table of the planets; see also the separate articles.

part of the sole in walking, are termed semi-plantigrada.



Plantigrada—foot of polar bear.

a, femur or thigh; b, tibia or leg; c, tarsus or foot; d, calx or heel; e, planta or sole of foot; f, digiti or toes.

PLASTERING is the art of covering the surface of masonry or wood work with a plastic material in order to give it a smooth and uniform surface, and generally in interiors to fit it for painting or decoration. In plastering the interior of houses a first coat is generally laid on of lime, thoroughly slacked, so as to be free from any tendency to contract moisture, and mixed with sand and cow's hair. For the purpose of receiving this coat the wall is generally first covered with laths or thin strips of wood, with narrow interstices between. The face of the first coat, which should be a considerable thickness, is trowelled, or indented with cross lines by the trowel, to form a key for the finishing coats. The second coat is applied to this

PLATINUM

medicinal. (See Blister.) The materials most frequently used in plasters are belladonna, cantharides, galbanum, isinglass, lead, mercury, opium, pitch, resin, iron, and soap, and their adhesive property is generally due to the combination of oxide of lead with fatty acids.

PLASTIC CLAY, in geology, a name given to one of the beds of the Eocene period from its being used in the manufacture of pottery. It is a marine deposit.

PLATA, Rio de La (River of Silver), or River Plate, runs for more than 200 miles between the Argentine Republic and Uruguay, and is not, strictly speaking, a river, but rather an estuary, formed by the junction of the great rivers Paraná and Uruguay (which see). It flows into the Atlantic between Cape St. Antonio and Cape St. Mary, and has here a width of 170 miles. On its banks are the cities and ports of Montevideo and Buenos Ayres.

PLATEAU (pla-tō). See Table-land.

PLATE-GLASS. See Glass.

PLATE-POWDER, a fine powder for cleaning gold and silver plate, commonly made of a mixture of rouge and prepared chalk.

PLATING, the coating of a metallic article with a thin film of some other metal, especially gold or silver. As regards plating with precious metals, electro-deposition has entirely superseded the old Sheffield method, which consisted in welding plates of various metals at high temperatures. This welding process is now, however, largely employed in plating iron with nickel for cooking vessels, iron with brass for stair-rods and other furnishing and domestic requisites, and lead with tin for pipes, etc.

PLATINUM, one of the metals first made known to Europe in 1741. Native platinum occurs mostly in small, irregular grains, generally contains a little iron, and is accompanied besides by iridium, osmium, rhodium, palladium, ruthenium (hence called the "platinum metals"), and also sometimes by copper, chromium, and titanium. It was first obtained in Peru, and has since been found in various other localities, such as Canada, Oregon, the West Indies, Brazil, Colombia, Borneo, etc., but the chief supply of platinum ore comes from the Ural mountains in Siberia. It was there discovered in beds of auriferous sands in 1823, and has been worked by the Russian government since 1828. Pure platinum is almost as white as silver, takes a brilliant polish, and is highly ductile and malleable. It is the heaviest of the ordinary metals, and the least expansive when heated; specific gravity 21.53 rolled, 21.15 cast. It undergoes no change from the combined agency of air and moisture, and it may be exposed to the strongest heat of a smith's forge without suffering either oxidation or fusion. Platinum is not attacked by any of the pure acids. Its only solvents are chlorine and nitro-muriatic acid, which act upon it with greater difficulty than on gold. In a finely divided state it has the power of absorbing and condensing large quantities of gases. On account of its great infusibility, and its power generally of withstanding the action of

PLANT. See Botany.

PLANTAGENET, a surname first adopted by Geoffrey, Count of Anjou, and said to have originated from his wearing a branch of broom (*plante de genêt*) in his cap. This name was borne by the fourteen kings, from Henry II. to Richard III., who occupied the English throne from 1154-1485. In 1400 the family was divided into the branches of Lancaster (Red Rose), and York (White Rose), and from their reunion in 1485 sprang the House of Tudor. See England.

PLANTATION, a term formerly used to designate a colony. The term was latterly applied to an estate or tract of land in the southern states of America, the West Indies, etc., cultivated chiefly by negroes or other non-European laborers. In the southern states the term planter is specially applied to one who grows cotton, sugar, rice, or tobacco.

PLANTIGRA'DA, plantigrades, carnivorous animals in which the whole or nearly the whole sole of the foot is applied to the ground in walking. This section includes the bears, raccoons, coatis, and badgers. Carnivora which, like the weasels and civets, use only

when it is thoroughly dried. It is rubbed in with a flat board so as thoroughly to fill the indentations and cover the unequal surface of the first coat with a smooth and even one. In plastering walls great care must be taken to have the surface perfectly vertical. The setting coat, which is of pure lime, or for mouldings or finer work of plaster of paris or stucco, is applied to the second coat before it is quite dry. A thin coating of plaster of paris is frequently applied to ceilings after the setting coat.

PLASTER OF PARIS, the name given to gypsum when ground and used for taking casts, etc. If one part of powdered gypsum be mixed with two and a half parts of water a thin pulp is formed, which after a time sets to a hard, compact mass. By adding a small quantity of lime to the moistened gypsum a very hard marble-like substance is obtained on setting.

PLASTERS are applications of local remedies to any part of the surface of the body by means of a supporting texture of leather, silk or other cloth, or merely of paper. Plasters may be intended to give protection, support, or warmth, or they may be actively

	Mean Distance From the Sun	Distance from the Earth		Time of Revolution Round the Sun	Time of Rotation on Axis		
		Greatest	Least		h.	m.	s.
	Miles	Miles	Miles	Mean Solar Days			
Mercury	35,393,000	135,631,000	47,229,000	87.9692	?		
Venus	66,131,000	159,551,000	23,309,000	224.7007	?		
The Earth	91,430,000			365.2563	23	56	4
Mars	139,312,000	245,249,000	63,389,000	686.9794	24	37	23
Jupiter	475,693,000	591,569,000	408,709,000	4332.5848	9	55	28
Saturn	872,135,000	1,014,071,000	831,210,000	10759.2197	10	29	17
Uranus	1,753,851,000	1,928,666,000	1,745,806,000	30686.8205	?		
Neptune	2,746,271,000	2,863,183,000	2,629,360,000	60126.722	?		

chemical reagents, platinum is much used as a material for making vessels to be used in the chemical laboratory. Crucibles, evaporating dishes, etc., are very often made of platinum; so also the large stills used for the evaporation of sulphuric acid. The useful alloys of platinum are not numerous. With silver it forms a tolerably fusible white alloy, malleable and brilliant when polished; but it scales and blackens by working. Gold, by a forge heat, combines with platinum, and the alloys, in all proportions, are more fusible than the latter metal. In the proportion of 38 grs. to 1 oz. it forms a yellowish-white, ductile, hard alloy, which is so elastic after hammering that it has been used for watch-springs; but the favorable results expected from them have not been realized. Alloyed with iridium (a rare metal of the same group) it possesses an excellent and unalterable surface for fine engraving, as in the scales of astronomical instruments, etc. This alloy has also been adopted for the construction of international standards of length and weight. Mercury, by trituration with spongy platinum, forms an amalgam at first soft, but which soon becomes firm, and has been much used in obtaining malleable platinum. A coating of platinum can be given to copper and other metals by applying to them an amalgam of spongy platinum and 5 parts of mercury; the latter metal is then volatilized by heat. Lead combines with platinum readily; and iron and copper in like manner. The last-mentioned, when added in the proportion of 7 to 16 of platinum and 1 of zinc, and fused in a crucible under charcoal powder, forms the alloy called artificial gold. Steel unites with platinum in all proportions, and, especially in the proportion of from 1 to 3 per cent of platinum, forms a tough and tenacious alloy, well adapted for cutting instruments. Arsenic unites easily with platinum, and is sometimes employed for rendering the latter metal fusible. An alloy of platinum, iridium, and rhodium is used for making crucibles, etc. It is harder than pure platinum, is less easily attacked by chemical reagents, and bears a higher temperature without fusing.

PLATO, an ancient Greek philosopher, founder of one of the great schools of Greek philosophy, was born at Athens in B.C. 429, died in B.C. 347. About his twentieth year he came directly under the influence of Socrates, and from this time he gave himself entirely to philosophy. He is said to have visited Cyrene (in North Africa), lower Italy, and Sicily. About B.C. 389 or 388 Plato returned to Athens and began to teach his philosophical system in a gymnasium known as the Academy, his subsequent life being unbroken, except by two visits to Sicily. He appears to have had a patrimony sufficient for his wants, and taught without remuneration. One of his pupils was Aristotle.

The reputed works of Plato consist of dialogues and letters, the latter now regarded as spurious; but the genuineness of most of the dialogues is generally admitted.

The philosophy of Plato must be regarded as one of the grandest efforts

ever made by the human mind to compass the problem of life. After the example of Socrates he held the great end of philosophic teaching to be to lead the mind of the inquirer to the discovery of truth rather than to impart it dogmatically, and for this end he held oral teaching to be superior to writing. The cardinal principle of Plato's dialectical system is the doctrine of ideas. True science, according to him, was conversant, not about those material forms and imperfect intelligences which we meet with in our daily intercourse with men; but it investigated the nature of those purer and more perfect patterns which were the models after which all created beings were formed. These perfect types he supposes to have existed from all eternity, and he calls them the ideas of the great original Intelligence. As these cannot be perceived by the human senses, whatever knowledge we derive from that source is unsatisfactory and uncertain. Plato, therefore, maintains that degree of scepticism which denies all permanent authority to the evidence of sense. Having discovered or created the realm of ideas he surveyed it throughout. He defined its most ex-



Plato.—Antique gem.

cellent forms of beauty, justice, and virtue, and having done so he determined what was the supreme and dominant principle of the whole. It is the idea of the Good. The harmony of intelligence throughout its entire extent with goodness, this is the highest attainment of Plato's philosophy. His ethical system was in direct dependence upon his dialectics. He believed that the ideas of all existing things were originally contained in God. These ideas were each the perfection of its kind, and as such were viewed by God with approval and love. God himself being infinitely good was the object of all imitation to intelligent beings, hence the ethics of Plato had a double foundation, the imitation of God and the realization of ideas, which were in each particular the models of perfection. To his cosmical theories he attributed only probability, holding that the dialectical method by which alone truth could be discovered was applicable only to ideas and the discovery of moral principles. The most valuable part of Plato's cosmogony is its first principle, that God, who is without envy, planned all things that they should be as nearly as possible like himself.

The followers of Plato have been divided into the Old, Middle, and New Academies; or into five schools; the

first representing the Old, the second and third the Middle, and the fourth and fifth the New Academy. In the first are Speusippus, Xenocrates, and Heraclides, and others. Of these the first reverted to pantheistic principles, the second to mysticism, and the last was chiefly distinguished as an astronomer. In the Middle Academy, of which were Arcesilas and Carneades, the founders of the second and third school, sceptical tendencies began to prevail. The New academy began with Philo of Larissa, founder of the fourth school.

PLATT, Thomas Collier, American political leader, was born at Owego, N. Y., in 1833. In 1872 he was elected to congress, again in 1874, and, upon the expiration of Francis Kernan's term as United States senator, was chosen his successor, January 18, 1881. He became connected with the United States express company, of which he has been president since 1883. Platt eventually gained virtual control of the republican party in New York and was again elected to the senate both in 1897 and in 1903. He has been a delegate to all republican national conventions since 1876 as well as a member of the national republican committee.

PLATTDEUTSCH (plät'doich), or Low German, is the language of the North German Lowlands, from the borders of Holland to those of Russian Poland. The Dutch and Flemish languages also belong to the Low German dialects, but being associated with an independent political system, and having a literature of their own, are reckoned as distinct languages. The Low German dialects agree in their consonantal system not only with Dutch and Flemish, but also with English and the Scandinavian tongues. (See Philology.) Until the reformation Low German was the general written language of the part of the continent above mentioned; but from that time Low German works became gradually fewer, owing to the position now taken by the High (or modern classical) German. Even as a spoken language High German has ever since been slowly superseding the Low. In recent times, however, Low German literature has received a new impetus from Klaus Groth and Fritz Reuter. Linguistically the Low German dialects have received a good deal of attention, and many valuable lexicographical works have appeared.

PLATTSBURG, a manufacturing town and military station of the United States, in the state of New York, on the Saranac, where it enters Lake Champlain. Pop. 10,010.

PLAYING-CARDS. See Card.

PLEBEIANS (ple-bé'anz), or **PLEBS**, in ancient Rome, one of the great orders of the Roman people, at first excluded from nearly all the rights of citizenship. The whole government of the state, with the enjoyment of all its offices, belonged exclusively to the patricians, with whom the plebeians could not even intermarry. The civil history of Rome is to a great extent composed of the struggles of the plebeians to assert their claim to the place in the commonwealth to which their numbers and social importance entitled them, and which were

crowned with complete success when (B.C. 286) the Lex Hortensia gave the plebiscita, or enactments passed at the plebeian assemblies, the force of law. From this time the privileges of the two classes may be said to have been equal.

PLEBISCITE, a vote of a whole nation obtained by universal suffrage, a form of voting introduced into France under the Napoleonic régime, and named after the Roman plebiscita. The term is also used in a more general sense.

PLEIADES (plí'a-déz), the so-called "seven stars" in the neck of the constellation Taurus, of which only six are visible to the naked eye of most persons. They are regarded by Mädlar as the central group of the Milky Way. Ancient Greek legends derive their name from the seven daughters of Atlas and the nymph Pleione, fabled to have been placed as stars in the sky, and the loss of the seventh was variously accounted for. In reality the cluster consists of far more than seven stars.

PLEISTOCENE (plis'to-sên), in geology, the lower division of the Post-tertiary formation. The fossil remains belong almost wholly to existing species. The Pleistocene mollusca all belong to still living species, but its mammals include a few extinct forms. It is also known as the "glacial" or "drift" period, owing to the great prevalence of glaciers and icebergs at that period.

PLENIPOTENTIARY, an ambassador appointed with full power to negotiate a treaty or transact other business.

PLESIOSAU'RUS, a genus of extinct amphibious animals, nearly allied to the Ichthyosaurus. The remains of this curious genus were first brought to light in the Lias of Lyme Regis in 1822, but over twenty species are now known, and they have formed the subject of important memoirs by Owen and other palæontologists. Its neck was of enormous length, exceeding that of its body; it possessed a trunk and tail of the proportions of an ordinary quadruped; to



Plesiosaurus, partially restored.

these were added the paddles of a whale. The neck vertebræ numbered forty or fewer. From twenty to twenty-five dorsal segments existed; and two sacral vertebræ and from thirty to forty caudal segments completed the spine. No distinct breast-bone was developed. The head was not more than $\frac{1}{2}$ or $\frac{1}{3}$ of the length of the body; the snout of a tapering form; the orbits large and wide. The teeth were conical, slender, curved inward, finely striated on the enamelled surface, and hollow throughout the interior. These animals appear to have lived in shallow seas and estuaries, and, in the opinion of some, they swam upon or near the surface, having the neck arched like the swan, and darting it down at the fish within reach. Some of

the Plesiosauri were upward of 20 feet long. Their remains occur from the Lias to the Chalk rocks inclusive, these forms being thus exclusively of the Mesozoic age.

PLETH'ORA, in medicine, an excess of blood in the human system. A florid face, rose-colored skin, swollen blood-vessels, frequent nose-bleeding, drowsiness and heavy feeling in the limbs, and a hard and full pulse, are symptoms, and this condition, habitual in many persons, and which, if not actually a disease, yet predisposes to inflammations, congestions, and hæmorrhages. Plethora may, however, develop in persons of all conditions and ages as the result of too much stimulating food (as an excessive meat-diet), over-eating, large consumption of malt and spirituous liquors, residence in northern and elevated regions with sharp, dry air, want of exercise, too much sleep, amputation of a limb—in short of any action tending to unduly increase the volume of blood. Plethora of a mild form may be reduced by copious draughts of diluents, a vegetable diet, and plenty of exercise; but in cases requiring prompt relief leeches or bleeding must be resorted to.

PLEURA, the serous membrane lining the cavity of the thorax or chest, and which also covers the lungs. Each lung is invested by a separate pleura or portion of this membrane. In the thorax each pleura is found to consist of a portion lining the walls of the chest, this fold being named the parietal layer of the pleura. The other fold, reflected upon the lung's surface, is named in contradistinction the visceral layer. These two folds inclose a space known as the pleural cavity, which in health contains serous fluid in just sufficient quantity to lubricate the surfaces of the pleuræ as they glide over one another in the movements of respiration. The disease to which the pleuræ are most subject is pleurisy.

PLEUR'ISY, the inflammation of the pleura. It may be acute or chronic, simple or complicated with catarrh and pneumonia. Generally part only of the pleura is affected, but sometimes the inflammation extends to the whole, and even to both pleuræ (double pleurisy). Acute, it is a very common complaint due to a variety of causes, but most frequently to sudden chills. It invariably commences with shivering, its duration and intensity generally indicating the degree of severity of the attack; fever and its attendant symptoms succeed the shivering. A sharp, lancinating pain, commonly called stitch in the side, is felt in the region affected at each inspiration. A short, dry cough also often attends this disease. While the inflammation continues its progress a sero-albuminous effusion takes place, and when this develops the febrile symptoms subside, usually from the fifth to the ninth day. Acute pleurisy is seldom fatal unless complicated with other diseases of the lungs or surrounding parts, and many patients are restored simply by rest, moderate sweating in bed, spare and light diet, mild and warm drinks, and the application of hot mustard and linseed-meal poultices to the affected part. Opiates to

relieve pain are often needful. When acute pleurisy is treated too late or insufficiently it may assume the chronic condition, which may last from six weeks to over a year, and result in death from gradual decay, as in the case of consumptives, or from asphyxia. Chronic pleurisy is characterized by effusion, which accumulates in the pleural cavity, and soon tends to produce lesions and complications in the surrounding organs. Besides local treatment purgatives and diuretics are used, but if the disease does not yield to these remedies, the liquid must be evacuated by operation. Pleurisy, acute and chronic, sometimes also appears without accompanying pain; it is then called latent pleurisy.

PLEURO-PNEUMONIA, a form of pneumonia peculiar to the bovine race. It is highly contagious, and proves rapidly fatal. It first manifests itself in a morbid condition of the general system; but its seat is in the lungs and pleura, where it causes an abundant inflammatory exudation of thick plastic matter. The lungs become rapidly filled with this matter, and increase greatly in weight. Whether pleuro-pneumonia is specifically a local or general disease is disputed, as also the manner of treatment. On the one hand bleeding and mercurial treatment, as in pleurisy and pneumonia, is recommended. On the other, evacuating remedies, maintaining the strength of the animal, and promoting the action of the skin, bowels, and kidneys.

PLINY (Caius Plinius Secundus), Roman writer, commonly called Pliny the Elder, was born A.D. 23, probably at Comum (Como). Every leisure moment was devoted to literature and science, and his industry was so great that he collected an enormous mass of notes, which he utilized in writing his works. He adopted his nephew, Pliny the Younger, A.D. 73, and perished in the eruption of Mount Vesuvius which overwhelmed Pompeii and Herculaneum in 79. The only work of Pliny which is now extant is his Natural History, a work containing a mass of information on physics, astronomy, etc., as well as natural history proper.

PLINY (Caius Plinius Cæcilius Secundus), the Younger, a nephew of the former, was born A.D. 61 at Comum (Como). Having lost his father at an early age, he was adopted by his uncle and inherited the latter's estates and MSS., and also his industry and love of literature. He was one of the most distinguished and best men of his age. The time of his death is unknown, but it is supposed that he died about the year 115. As an author he labored with ardor, and attempted both prose and poetry. Of his writings only a collection of letters in ten books, and a panegyric on Trajan, remain.

PLIOCENE, a geological term applied to the most modern of the divisions of the Tertiary epoch. The Tertiary series Sir C. Lyell divided into four principal groups, namely, the Eocene and the Miocene (which see), the Older Pliocene, and the Newer Pliocene or Pleistocene each characterized by containing a very different proportion

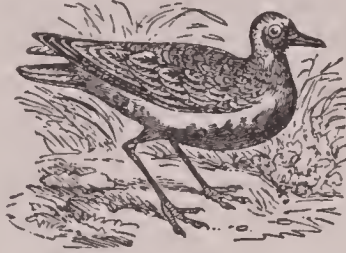
of fossil recent (or existing) species. The Newer Pliocene, the latest of the four, contains from 90 to 95 per cent of recent fossils; the Older Pliocene contains from 35 to 50 per cent of recent fossils. The Newer Pliocene period is that which immediately preceded the recent era; and by the latest system of classification it has been removed from the Tertiary and placed in the Post-tertiary or Quaternary epoch. The Pliocene period proper, or the Crag period, is that which intervened between the Miocene and the Newer Pliocene. Both the Newer and the Older Pliocene exhibit marine as well as fresh-water deposits.

PLOCK (plotsk), or **PLOTZK**, capital of the government of the same name in Russian Poland, on the right bank of the Vistula, 78 miles n.w. of Warsaw. It has a handsome cathedral, dating from the 10th century, and a bishop's palace. Its manufactures are unimportant, but it has a large trade. Pop. 27,073.—The province has an area of 4209 sq. miles, mostly level, and marshes and lakes abound. Fully one-third of the area is forest. Corn and potatoes are the chief agricultural products, and sheep and cattle are extensively reared. Pop. 577,490.

PLOUGH, an implement drawn by animal or steam power, by which the surface of the soil is cut into longitudinal slices, and these successively raised up and turned over. The object of the operation is to expose a new surface to the action of the air, and to render the soil fit for receiving the seed or for other operations of agriculture.—Steam ploughs on various principles have latterly become familiar among farmers. Some are driven by one engine remaining stationary on the headland, which winds an endless rope (generally of wire) passing round pulleys attached to an apparatus called the "anchor," fixed at the opposite headland, and round a drum connected with the engine itself. Others are driven by two engines, one at either headland, thus superseding the "anchor." As steam-ploughing apparatus are usually beyond both the means and requirements of single farmers, companies have been formed for hiring them out. In steam-ploughing it is common to use ploughs in which two sets of plough bodies and coulters are attached to an iron frame moving on a fulcrum, one set at either extremity, and pointing different ways. By this arrangement the plough can be used without turning, the one part of the frame being raised out of the ground when moving in one direction, and the other when moving in the opposite. It is the front part of the frame, or that farthest from the driver, which is elevated, the ploughing apparatus connected with the after part being inserted and doing the work. Generally two, three, or four sets of plough bodies and coulters are attached to either extremity, so that two, three, or four furrows are made at once.

PLOVER, the common name of several species of birds. They inhabit all parts of the world. They are gregarious, and most of them are partial to the muddy borders of rivers and marshy situations, subsisting on worms and various aquatic insects; but some of them affect dry

sandy shores. Their general features are: bill long, slender, straight, compressed; nostrils basal and longitudinal; legs long and slender, with three toes before, the outer connected to the middle one by a short web; wings middle-size. Most of them moult twice a year, and the males and females are seldom very dissimilar in appearance. The various species pass so imperceptible into one



Golden plover.

another that their classification is often attended with difficulty. All nestle on the ground. They run much on the soil, patting it with their feet to bring out the worms, etc. The golden plover, also called yellow and whistling plover, is the best known, and its flesh and its olive-green dark-spotted eggs are considered a delicacy by epicures.

PLUM, a genus of plants. About a dozen species are known, all inhabiting the north temperate regions of the globe. They are small trees or shrubs, with alternate leaves and white flowers, either solitary or disposed in fascicles in the axils of the leaves. The common garden plum is the most extensively cultivated, and its fruit is one of the most familiar of the stone-fruits. The varieties are very numerous, differing in size, form, color, and taste. Some are mostly eaten fresh, some are dried and sold as prunes, others again are preserved in sugar, alcohol, syrup, or vinegar. They make also excellent jams and jellies, and the syrup from stewed plums forms a refreshing drink for invalids, and a mild aperient for children. Perhaps the most esteemed of all varieties is the green gage. A very popular and easily grown sort is the damson. The wood of the plum-tree is hard, compact, traversed with reddish veins, susceptible of a fine polish, and is frequently employed by turners and cabinet-makers. The sloe or black-thorn is a species of wild plum bearing a small, round, blue-black, and extremely sour fruit. Its juice is made into prune-wine, which is chiefly employed by distillers, wine and spirit merchants, etc., for fining, coloring, purifying, and mellowing spirits.

PLUMBA'GO. See Graphite.

PLUMMET, plumb-line, a leaden or other weight let down at the end of a cord to regulate any work in a line perpendicular to the horizon, or to sound the depth of anything. Masons, carpenters, etc., use a plumb-line fastened on a narrow board or plate of brass or iron to judge whether walls or other objects be perfectly perpendicular, or plumb as the artificers call it. Near a range of high mountains the plumb-line, as can be shown by special arrangements, is not perfectly true, but inclines toward the mountains; and officers in charge of the United States coast and Geodetic Sur-

vey among the Hawaiian Islands, have recently observed that the deviation of a plumb-line from the vertical is greater in the case of mountains in an island than in continental mountains, and greater in the neighborhood of extinct volcanoes than that of active volcanoes. In given localities the plumb-line also varies according to the ebb and flow of the tide.

PLU'MULE, in botany, that part of the seed which grows into the stem and axis of the future plant. In the seeds of the bean, horse-chestnut, etc., the plumule is distinctly visible, but in plants generally it is scarcely perceptible without the aid of a magnifying glass, and in many it does not appear



P, Plumule.

till the seed begins to germinate. The first indication of development is the appearance of the plumule, which is a collection of feathery fibers bursting from the enveloping capsule of the germ, and which proceeds immediately to extend itself vertically upward.

PLUS (L., more), in mathematics, signifies addition; the sign by which it is indicated is +; thus $A + B$, which is read A plus B, denotes that the quantity A is to be added to the quantity B. Plus, or its sign +, is also used to indicate a positive magnitude or relation, in opposition to minus —, which indicates a negative.

PLUSH, a fabric similar to velvet, from which it differs only in the length and density of the nap. The nap may be formed either in the warp or woof, the one in which it is being double, there being a warp and a woof for the nap. Plushes are now made almost exclusively of silk. The cheaper qualities have a cotton backing. Some of the finest dress plushes are produced in London, plushes for gentlemen's hats come chiefly from Lyons, while common or imitation plushes are largely manufactured in Germany. Plush is now also extensively used in upholstery and decorative work.

PLUTARCH (plō'tark), a learned Greek writer, born at Cheronæa in Bœotia, where he also died. Neither the year of his birth nor that of his death is accurately known, but it is generally held that he lived from the reign of Nero to that of Hadrian (54–117 A.D.). He appears from his writings to have visited Italy, lectured there on philosophy, and stayed some time at Rome, where he established a school during the reign of Domitian. His *Parallel Lives of Illustrious Greeks and Romans* is the work to which he owes his fame. The lives are nearly all written in pairs, one Greek and one Roman, followed by a comparison of the two, and are models of biographical portraiture. We have numerous editions and translations of them. Plutarch's other works, about sixty in number, are generally classed as moralia, though some of them are narrative. His writings show that he was well acquainted with the literature of his time,

and with history, and that he must have had access to many books.

PLUTO, in classical mythology, the god of the infernal regions, the ruler of the dead. He was a son of Cronus and Rhea, a brother of Zeus (Jupiter) and Poseidon (Neptune), and to him, on the partition of the world, fell the kingdom of the shades. He married Persephōnē (which see). By the Greeks he was generally called Hades and by the Romans Orcus, Tartarus, and Dis Pater. As is the case with all other pagan deities, the accounts of Pluto vary with different writers and periods, and in later ages he was confounded with Plutus. The worship of Pluto was extensively spread among the Greeks and Romans. The cypress, the box, the narcissus, and the plant adiantum (maiden-hair), were sacred to him: oxen and goats were sacrificed to him in the shades of night, and his priests were crowned with cypress. He is represented in gloomy majesty, his forehead shaped by his hair, and with a thick beard. In his hand he holds a two-forked scepter, a staff, or a key; by his side is Cerberus. He is often accompanied by his wife.

PLUTONIC ROCKS, unstratified crystalline rocks, such as granites, greenstones, and other, of igneous origin, formed at great depths from the surface of the earth. They are distinguished from those called volcanic rocks, although they are both igneous; plutonic rocks having been elaborated in the deep recesses of the earth, while the volcanic are solidified at or near the surface.

PLUTUS, in Greek mythology, the god of riches. Zeus struck him blind because he confined his gifts to the good; and he thenceforth conferred them equally on the good and the bad. His residence was under the earth. Plutus is the subject of Aristophanes' comedy of the same name.

PLUVIOSE, the fifth month of the French republican calendar, including January 20—Feb. 18 or 19. See Calendar.

PLYMOUTH (plim'uth), a seaport, municipal, parl., and county borough of England, in Devonshire, at the head of

structed at a cost of about \$10,000,000. The western harbor, is specially devoted to the royal navy, and here are the dockyard, and Keyham steam-yard. The mercantile marine is accommodated in the eastern harbor. Pop. 107,509.

PLYMOUTH, a seaport and capital of Plymouth co. Massachusetts, 37 miles s.e. of Boston, founded by the Pilgrim Fathers in 1620. It is situated in a capacious but shallow bay, and has extensive fisheries, rope and canvas factories, also iron-works. Pilgrim Hall, and a colossal monument to the pilgrims, on the top of the adjoining hill, are the chief sights of the place. Pop. 10,485.

PLYMOUTH, a growing town in Lucerne co., Penn. Coal mining is extensively carried on. Pop. 14,879.

PLYMOUTH BRETHREN, Plymouthites, a sect of Christians who first appeared at Plymouth in 1830, but have since considerably extended over Great Britain, the United States, and among the Protestants of France, Switzerland, Italy, etc. They object to national churches as being too lax, and to dissenting churches as too sectarian, recognizing all as brethren who believe in Christ and the Holy Spirit as his Vicar. They acknowledge no form of church government nor any office of the ministry, all males being regarded by them as equally entitled to "prophecy" or preach.

PLYMOUTH ROCK, a ledge of rock in Plymouth harbor, Mass., on which the Pilgrims are said to have stepped when disembarking. A beautiful granite canopy has been erected upon the rock.

PLYMOUTH ROCK, a breed of domestic fowls. It is of large size and has valuable qualities for market purposes. The favorite variety is the "barred," of a grayish white color, every feather marked with many curving black bands. The average weight of the cock is 9½ pounds, of hens 7½ pounds.

PNEUMATIC DISPATCH, propulsion by means of compressed air or by forming a vacuum. Pneumatic railways have thus far proved abortive, but propulsion by compressed air has been successfully applied to a variety of practical uses. Parcels are thus conveyed, and internal communication in mercantile houses, hotels, etc., is carried on by its means. The most developed application of compressed air as a motive force is in connection with the telegraph and post-office service of large cities. Pneumatic dispatch, which has proved a most useful auxiliary in securing prompt and cheap collection and distribution of telegraphic messages, was first introduced in London by Latimer Clark in 1853, improved by Varley 1858, and again by Siemens in 1863. The vehicles charged with the messages, technically called carriers, are forced through leaden tubes connecting the various stations, and from 1½ to 3 inches, diameter by means of air-pressure at one end, or sucked through by a partial vacuum at the other. The invention of Latimer Clark and Varley required a separate tube between each pair of stations, and admitted of only a single despatch at a time; but a system of laying tubes in circuit for the continuous transmission of dispatches, by means of an uninter-

rupted air-current in one direction, was adopted in Berlin by Messrs. Siemens and Halske in 1863, and introduced in London in 1870. Pneumatic tubes are also in growing use in Liverpool, Manchester, Glasgow, Dublin, etc. The circuit system, but not with a continuous current, is extensively used in Paris. The first attempt at pneumatic dispatch in America was made by A. E. Beach in 1867. The construction of an atmospheric railway tunnel was commenced but after a short distance was complete the work was abandoned. This was the first and only attempt at atmospheric railway construction in America. The use of pneumatic dispatch has, however, become very extensive. It is in use in all the large cities in stores for carrying cash to and from a centrally located cashier's desk and in a great many cities it is also used in carrying small parcels. The post-office department of New York, Philadelphia, Chicago and other large cities use it extensively, and it is proposed to keep extending the service as fast as possible.

PNEUMATICS, that branch of physics which treats of the mechanical properties of elastic fluids, and particularly of atmospheric air. The chemical properties of elastic fluids (air and gases) belong to chemistry. Pneumatics treat of the weight, pressure, equilibrium, elasticity, density, condensation, rarefaction, resistance, motion, etc., of air; it treats also of air considered as the medium of sound (acoustics), and as the vehicle of heat, moisture, etc. It also comprehends the description of those machines which depend chiefly for their action on the pressure and elasticity of air, as the various kinds of pumps, artificial fountains, etc. The weight of the air, and its pressure on all the bodies on the earth's surface, were quite unknown to the ancients, and only first perceived in the middle of the 17th century by Galileo, when a sucking-pump refused to draw water above a certain height; and to Torricelli, his pupil, belongs the honor of giving first a natural explanation of the phenomenon. See Air, Air-pump, Atmosphere, Barometer, Gas, Pump, etc.

PNEUMONIA, acute inflammation of the lung substance. The more general symptoms are feverishness, constant pressing pain on the chest, difficult breathing and painful cough. The base of the lung is generally attacked, and the right lung twice as often as the left, but both may be affected. Pneumonia is frequently complicated with pleurisy (which see). The patient must be kept quiet in bed, the affected parts poulticed and the bowels attended to. Mild nourishing diet, with medicines to stimulate the skin and to reduce fever, should be given.

PO, the largest river of Italy. It rises on the confines of France and Piedmont in Mount Viso, one of the Cottian Alps, and receives during its long course to the Adriatic (about 450 miles), a vast number of tributary streams. It divides the great plain of Lombardy into two nearly equal parts, and is the grand receptacle for the streams flowing south from the Alps, and for the lesser waters that flow north from a part of the



Plymouth Sound. Plymouth is well defended both land- and seaward by a series of forts of exceptional strength provided with heavy ordnance. A stupendous breakwater has been con-

Apennine range. Its principal affluents are, on the left, the Baltea, Sesia, Ticino, Adda, and Mincio; on the right the Tanaro, Trebbia, and Panaro. The Po, in spite of embankments, etc., is the cause of frequent inundations, especially near its mouth. In some places, owing to the silt carried down, its channel is now raised above the country through which it flows. Fish are plentiful in it, including the shad, salmon, and even sturgeon.

PNEUMATIC TOOLS, portable, self-contained-motor tools, for metal and wood working, operated by compressed air. In the percussion type work is done by rapidly repeated percussive blows and in the rotary type by a rotary or boring action. The motive power used is air under pressure, and the motor is contained within the tool. There are nearly 100 different styles of tools in use and new appliances are being constantly discovered. Hammering, ramming, calking, chipping, riveting, shaving, drilling, boring, screwing, clipping, carving, and expanding tubes are some of the classes of work done.

POACHING, the trespassing on another's property for the purpose of killing or stealing game or fish. For the law relating to the poaching of game see Game Laws.

POCAHONTAS, daughter of Powhatan, a celebrated American-Indian warrior of Virginia, born about the year 1595. Some romantic incidents are told of her life, but there seem to be considerable doubts as to their truth. She is said to have shown a great friendship for the English who colonized Virginia, and to have rendered them substantial services. In 1607 she prevailed on her father to spare the life of Captain John Smith, his prisoner, and two years later



Pocahontas.

frustrated a plot to destroy him and his party. After Captain Smith had left the colony she was kept as a hostage by an English expeditionary force (1612). During this detention she married Mr. Rolfe, an Englishman, who in 1616 took her on a visit to England, where she was baptized and assumed the name of Rebecca. She died the following year, and left one son, who was educated in London, and whose descendants are said to exist still in the state of Virginia.

PODIEBRAD (pod'ye-brád), George, King of Bohemia, born 1420, died 1471. In 1444 he became one of the two governors of Bohemia during the minority of Ladislav, Albert's posthumous son, now

king of the country, and, after overcoming the Catholic opposition, sole regent in 1451. Ladislav died in 1457, and Podiebrad was elected to the throne in the following year, and crowned by the Catholic bishops in 1459. He inaugurated his reign by the introduction of various beneficent laws, wise administration, and a policy of conciliation toward the Catholics; but he was not allowed to carry out his reforms in peace. The pope, Paul II., publicly denounced him as an heretic in 1463, excommunicated him, and his legate soon produced a rising among the Catholics. In order to secure the aid of the Poles he declared the successor to the throne of Poland to be his own successor, while his sons should only inherit the family estates (1469). The Poles were thus immediately drawn to his side; the Emperor Frederick also declared in his favor; and his Catholic subjects became reconciled to him. Shortly after he destroyed the infantry of the Hungarians. He thus saw himself at last completely secured in his kingdom; but no sooner was this accomplished than he died; being succeeded by Ladislav, eldest son of Casimir IV., king of Poland, who thus united the two crowns.

PODO'LIA, a government of South-western Russia; area, 16,224 sq. miles. The climate is temperate and salubrious, the soil generally very fertile; in fact, Podolia forms one of the most valuable agricultural possessions of the Russian Empire. Pop. 3,031,500. Capital, Kamenez.

POE, Edgar Allan, American poet and romantic writer, born at Baltimore 1809, died in the same city 1849. His father and mother were actors, and being left an orphan when a mere child he was adopted by Mr. Allan, a wealthy Baltimore merchant. His early education he received at Stoke-Newington, London, 1816-21, and on his return to America attended a school at Richmond, Virginia, and finally entered the University of Charlottesville. Here he displayed extraordinary talents, but also contracted a taste for fast living which occasioned quarrels with his benefactor, and caused him to quit America for Europe. He took part in the struggles of the Greeks for independence, and for a few years led an erratic life on the continent. In 1829 he returned to America, a reconciliation with Mr. Allan took place, and he was sent as cadet to the military academy at West Point. Further irregularities brought about a complete rupture with Mr. Allan, and Poe enlisted as a private soldier, however, only to desert later on. His literary career may be said to have begun in 1835, when he gained the prize offered by the Baltimore Saturday Visitor for a tale and a poem. He then became successively editor of the newly-founded Southern Literary Messenger at Richmond, contributor to the New York Review at New York, and editor of Burton's Gentleman's Magazine and Graham's Magazine at Philadelphia. For these periodicals he wrote a number of tales, exhibiting a weird yet fascinating imagination. While at Richmond, in 1836, he married his cousin, Virginia

Clemm, a beautiful and amiable girl. The great event in Poe's life was the publication at New York in 1845 of his poem the Raven, which spread his fame to the whole English-speaking world. For this remarkable production Poe is said to have received \$10.00. He was subsequently connected with The Home Journal and The Broadway Journal. In 1848 his wife died. Passing through Baltimore in 1849, on his way to New York to make preparations for a second marriage, he was led to excessive drinking, and died from its effects at the hospital.

POET LAUREATE. See Laureate.

POETRY, that one of the fine arts which exhibits its special character and powers by means of language; or, according to Aytoun, the art which has for its object the creation of intellectual pleasures by means of imaginative and passionate language, and language generally, though not necessarily, formed into regular numbers. It has also been defined as the concrete and artistic expression of the human mind in emotional and rhythmical language. It is the earliest form of literature, and also the final and ideal form of all pure literature; its true place lying between music on the one hand and prose or loosened speech on the other. The poet deals with language as the painter does with color, sometimes invading the domain of music and sometimes that of prose, or rather he brings prose into the domain of poetry. The two great classes of poetic impulse are dramatic imagination and lyric imagination. Partaking of the character of both is epic or narrative poetry. (See Epic.) To the dramatic class belong tragedy and comedy; to the lyric belong the song, hymn, ode, anthem, elegy, sonnet, and ballad, though the last-named frequently has a kind of epic character. Other forms, such as "didactic" poetry, "satirical" poetry, are also in use, but it is a question if they enter into the circle of poetry at all. See separate articles on the various species. Poetics is the theory of poetry; that branch of criticism which treats of the nature and laws of poetry.

POINT, in geometry, is a quantity which has no parts, or which is indivisible, or which has position without magnitude. Points may be regarded as the ends or extremities of lines. If a point is supposed to be moved in any way, it will by its motion describe a line.

POINTER DOG, a breed of sporting dogs, nearly allied to the true hounds. The original breed is Spanish, but a cross with the fox-hound is now generally used. It is smooth, short-haired, generally marked black and white like the fox-hound, but occasionally a uniform black. It derives its name from its habit of stopping and pointing with the head in the direction of game, discovered by a very acute sense of smell. The dog once having pointed remains perfectly quiet. This faculty in the pointer is hereditary, but is better developed by training.

POISON, any agent capable of producing a morbid, noxious, dangerous, or deadly effect upon the animal economy, when introduced either by cutaneous absorption, respiration, or the diges-



PNEUMATIC TOOLS

Driving 3-4 inch Rivets in Ship work
Long Stroke Hammer on Structural work
Flat frame Riveter on Structural work

Long Stroke Hammers on Bridge work
Long Stroke Hammer on Boiler work
Drills in use on Bridge work

tive canal. Poisons are divided, with respect to the kingdom to which they belong, into animal, vegetable, and mineral; but those which proceed from animals are often called venoms, while those that are produced by disease have the name virus. With respect to their effects they have been divided into four classes, namely, irritant, narcotic, narcotico-acrid, and septic or putrescent. Many poisons operate chemically, corroding the organized fiber, and causing inflammation and mortification. To this class belong many metallic oxides and salts, as arsenic, one of the most deadly poisons; many preparations of copper, mercury, and antimony, and other metals; the mineral and vegetable acids; the substance derived from some plants, as the spurges and mezereon; and cantharides, from the animal kingdom. Other poisons exercise a powerful action upon the nerves and a rapid destruction of their energy. These are the sedative or stupefying poisons, and belong for the most part to the vegetable kingdom. Opium, hemlock, henbane, belladonna, are the best-known forms of this poison. Prussic acid, a poison obtained from the kernels of several fruits, the cherry-laurel, etc., is one of the most rapid destroyers of life. Among plants there are many which unite the properties of both kinds, as the common foxglove, and the monkshood or aconite. An alkaloid is extracted from the latter, $\frac{1}{16}$ th of a grain of which has proved fatal. Another class of poisons suddenly and entirely cause a cessation of some function necessary to life. To this class belong all the kinds of gas and air which are irrespirable, suffocating vapors, as carbonic acid gas, fumes of sulphur and charcoal, etc. Many preparations of lead, as acetate or sugar of lead, carbonate or whitelead, etc., are to be counted in this class. The effect of poisons materially depend on the extent of the dose, some of the most deadly poisons being useful remedies in certain quantities and circumstances. Antidotes naturally vary with the different kinds of poisons. They sometimes protect the body against the operation of the poison, sometimes change this last in such a manner that it loses its injurious properties, and sometimes remove or remedy its violent results. Thus in cases of poisoning by acrid and corrosive substances we use the fatty, mucilaginous substances, as oil, milk, etc., which sheathe and protect the coats of the stomach and bowels against the operation of the poison. Against the metallic poisons substances are employed which form with the poison insoluble compounds, such as freshly prepared hydrated oxide of iron, or dialysed iron for arsenic, albumin (white of egg) for mercury; Epsom or Glauber's salts for lead. Lime, chalk, and magnesia are the best remedies for the powerful acids. For cantharides, mucilage, gruel, and barley-water are employed. We oppose to the alkaline poisons the weaker vegetable acids, as vinegar. Prussic acid is neutralized by alkalis and freshly precipitated oxide of iron. To arouse those poisoned by opium, we use coffee and ammonia, and belladonna as an antagonistic drug.

Chloral-hydrate poisoning is similarly treated; and for strychnia or nuxvomica, animal charcoal in water and chloral-hydrate are used. The sale of poison is regulated and restricted by law. Poisoning was common in ancient Rome, and in France and Italy during the 17th century.

POITIERS, DIANA OF. See Diana of Poitiers.

POKEWEED, a North American branching herbaceous plant. Its root acts as a powerful emetic and cathartic, but its use is attended with narcotic effects. Its berries are said to possess the same quality; they are employed as a remedy for chronic and syphilitic rheumatism, and for allaying syphilitic pains. The leaves are extremely acrid, but the young shoots, which lose this quality by boiling in water, are eaten in the United States as asparagus.

POLACCA, or **POLACRE**, a three-masted vessel used in the Mediterranean. The masts are usually of one piece, so that they have neither tops, caps, nor cross-trees. It carries a fore-and-aft sail on the mizzen-mast, and square sails on the main-mast and fore-mast.

POLAND, an extensive territory of central Europe, which existed for many centuries as an independent and powerful state; but having fallen a prey to internal dissensions, was violently seized by Austria, Prussia, and Russia as a common spoil, partitioned among these three powers, and incorporated with their dominions. In its greatest prosperity it had at least 11,000,000 of inhabitants, and an area of 350,000 sq. miles, and immediately before its first partition an area of about 282,000 sq. miles, stretching from the frontiers of Hungary and Turkey to the Baltic, and from Germany far east into Russia, forming one compact kingdom. With the exception of the Carpathians, forming its southwestern boundary, and a ridge of moderate elevation penetrating into it from Silesia, the country presents the appearance of an almost unbroken plain, composed partly of gently-undulating expanses, partly of rich alluvial flats, partly of sandy tracts, and partly of extensive morasses. Its principal streams are the Vistula, the Niemen, and the Dwina, all belonging to the basin of the Baltic; and the Dniester, South Bug, and Dnieper, with its tributary, Pripet, belonging to the basin of the Black sea. The physical configuration of the country makes it admirably adapted for agriculture. Next to grain and cattle its most important product is timber.

The Poles, like the Russians, are a Slavonic race, and are first spoken of as the Polani, a tribe or people between the Vistula and Oder. The country was divided into small communities until the reign of Mieczyslaw I. (962-992) of the Piast dynasty, who renounced paganism in favor of Christianity, and was a vassal of the German emperor. He was succeeded by Boleslaw the Great (992-1025) who raised Poland into an independent kingdom and increased its territories. In succeeding reigns the country was involved in war with Germany, the heathen Prussians, the Teutonic knights, and with Russia. The last of the Piast

dynasty was Casimir the Great (1364-70), during whose reign the material prosperity of Poland greatly increased. He was succeeded by his nephew, Louis of Anjou, king of Hungary, whose daughter, Hedwig, was recognized as "king" in 1384, and having married Jagello, prince of Lithuania, thus established the dynasty of the Jagellons, which lasted from 1386 to 1572. During this period Poland attained its most powerful and flourishing condition. In 1572 the Jagellon dynasty became extinct in the male line, and the monarchy, hitherto elective in theory, now became so in fact. The more important of the elective kings were Sigismund III. (1587-1637, Wladislaw or Ladislaus IV. (1632-48), John Casimir (1648-69), and the Polish general Sobieski, who became king under the title of John III. (1674-96). He was succeeded by Augustus II., Elector of Saxony, who got entangled in the war of Russia with Charles XII., and had as a rival in the kingdom Stanislaus Leszczynski. Augustus III. (1733-63) followed, and by the end of his reign internal dissensions and other causes had brought the country into a state of helplessness. In 1772, under the last feeble king Stanislaus Augustus (1764-95), the first actual partition of Poland took place, when about a third of her territories were seized by Prussia, Austria, and Russia, the respective shares of the spoil being Prussia 13,415 sq. miles, Austria 27,000 sq. miles, and Russia 42,000 sq. miles. What remained to Poland was completely under Russian influence. Another partition in 1793 gave Russia nearly 97,000 sq. miles and Prussia 22,500 sq. miles. A third partition took place in 1795 after the heroic attempt of Kosciusko to save his country, and the last king of Poland became a pensionary of the Russian court. The successive partitions gave Russia upward of 180,000 sq. miles, Austria about 45,000 sq. miles, and Prussia 57,000 sq. miles. From 1815 to 1830 Russian Poland was a constitutional monarchy with the emperor as king, but the Poles, taking occasion of the French revolution at the latter date rashly engaged in an insurrection, which only hastened their complete absorption in Russia. The name Kingdom of Poland indeed remains, but all the autonomic institutions of the country have been swept away, and the whole country is being rapidly Russified. The Polish language has been entirely superseded by Russian in all courts of law, educational establishments and public offices; and all official correspondence must be in Russian. The population in 1907 was 9,442,590, of whom over 70 per cent were Roman Catholics.

POLAR BEAR. See Bear.

POLAR CIRCLES, two imaginary circles of the earth parallel to the equator, the one north and the other south, distant 23° 28' from either pole. See under Arctic.

POLAR DISTANCE, the angular distance of any point on a sphere from one of its poles; more especially, the angular distance of a heavenly body from the elevated pole of the heavens. It is measured by the intercepted arc of the circle passing through it and

POLAR EXPLORATION

through the pole, or by the corresponding angle at the center of the sphere.

POLAR EXPLORATION, a term used to describe the continued efforts of civilized man, first to discover a north-western passage to India, and more recently to find the north pole itself. The record thus far stands as follows: Commander Robert E. Peary holds the record for the highest north. He reached latitude 87 degrees 6 minutes north, or 203 statute miles from the pole. The south polar record is held by Lieut. Shackleton of the British Navy who reached latitude 88° 23' and longitude 162° east, within 111 miles of the south pole.

Early exploration began in 1517 with Sebastian Cabot, who was commissioned by Henry VIII. to search for a northwest passage round America to India. This gave rise to the explorations by water which for a long time held the attention of navigators and were the only methods until the land method was pretty well developed. Frobisher, Davis, Hudson, Bylot, Baffin, Franklin, and Ross sailed north, and their work is recorded in the names to be found

expeditions to the poles and the highest north and south reached:

Peary.....	87 deg. 06 m.
Captain Cagni (Abruzzi expedition).....	86 " 34 "
Nansen.....	86 " 14 "
Peary.....	84 " 17 "
Greely.....	83 " 24 "
Nares.....	83 " 20 "
Parry.....	82 " 45 "
Hall.....	82 " 11 "
Payer.....	82 " 05 "
Wellman.....	82 " 00 "
Borchgrevink (South Pole).....	78 " 50 "
Ross.....	78 " 10 "
Scott.....	80 " 17 "

In 1906 Peary, Wellman and Captain Amundsen made further explorations in the polar regions, Wellman outlined an unsuccessful dash for the pole in a balloon notwithstanding the loss of André and his companions in a similar venture. One of the important results of polar research is the present methods and outfit for work and life in the ice zones, evolved from the experience of three centuries. The art of selecting and preserving foods of healthful and



Scene in the Arctic regions showing the comparative size of the glaciers and a ship.

in every school geography. Expeditions by land were made by Richardson and Rae (1847), Moore (1848-52), Kellet (1848-50), Shedden (1848-50), Ross (1848-49), Saunders (1849-50), Austin and Ommaney (1850-51) and Penny (1850-51). Maclure (1850) found the long searched for passage, the use of which had long since become of no importance owing to the development of steam.

Present day research in the arctic region is purely scientific. No commercial advantage is to be won from polar discovery and this fact accounts for the difficulty in raising large sums for this purpose. The United States has had its share of honor in the work partly because of the liberality of rich Americans and partly because of the heroism of American explorers. Greely for a long time held the record for highest north, and Peary and Wellman have added considerably to the sum of polar geography and other sciences. The following is a list of noteworthy

great nutritive quality for use on polar expeditions has been reduced to a science. The ships employed by explorers were formerly poorly equipped for battling with the ice; but the exploring craft of the present, of which the Fram, Discovery and Gauss are the best examples, are believed closely to approximate the ideal type of vessel for ice navigation. They are built with rounded sides, so as to offer as little hold as possible to the clutches of the ice-pack, and they provide comparatively comfortable accommodations for the men.

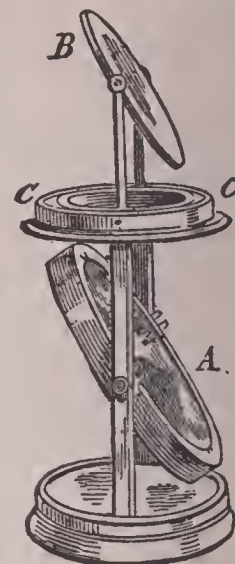
POLAR FORCES, in physics, forces that are developed and act in pairs with opposite tendencies, as in magnetism, electricity, etc.

POLA'RIS, the pole-star, which see.

POLARISCOPE, an optical instrument, various kinds of which have been contrived, for exhibiting the polarization of light, or for examining transparent media for the purpose of determining their polarizing power. The important

POLARIZATION OF LIGHT

portions of the instrument are the polarizing and analysing plates or prisms, and these are formed either of natural crystalline structures, such as Iceland-spar and tourmaline, or of a series of reflecting surfaces artificially joined together. The accompanying figure shows Malus' polariscope. A and B



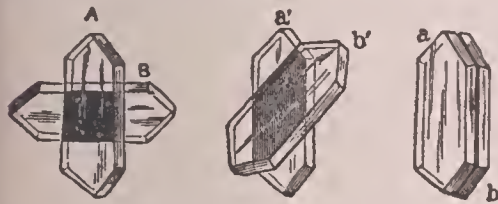
Polariscope.

are the reflectors, the one serving as polarizer, the other as analyzer, each consisting of a pile of glass plates. Each reflector can be turned about on a horizontal axis, and the upper one, or analyzer, can also be turned about on a vertical axis, the amount of rotation being measured on the horizontal circle c c. See Polarization of Light.

POLARITY, that quality of a body in virtue of which peculiar properties reside in certain points called poles; usually, as in electrified or magnetized bodies, properties of attraction or repulsion, or the power of taking a certain direction; as, the Polarity of the magnet or magnetic needle, whose pole is not that of the earth, but a point in the Polar Regions. A mineral is said to possess polarity when it attracts one pole of a magnetic needle and repels the other.

POLARIZATION OF LIGHT, an alteration produced upon light by the action of certain bodies by which it is made to change its character. A common ray of light exhibits the same properties on all sides, but any reflected or refracted ray, or a ray transmitted through certain media, exhibits different properties on different sides; and is said to be polarized. The polarization of light may be effected in various ways, but chiefly in the following:—(1) By reflection at a proper angle (the "polarizing angle") from the surfaces of transparent media, as glass, water, etc. (2) By transmission through crystals possessing the property of double refraction, as Iceland-spar. (3) By transmission through a sufficient number of transparent uncrystallized plates placed at proper angles. (4) By transmission through a number of other bodies imperfectly crystallized, as agate, mother-of-pearl, etc. The knowledge of this singular property of light has afforded an explanation of some interesting

phenomena in optics. A simple example of polarization may be illustrated by two slices of the semi-transparent mineral tourmaline cut parallel to the axis of the crystal. If one is laid upon the other in the positions A B (see fig. below) they form an opaque combination. If one is turned round upon the other at various angles it will be found that greatest transparency is produced in the position corresponding with $a b$ (which represents the natural position they originally occupied in the crystal), an intermediate stage being that shown at $a' b'$. The light which has passed through the one plate is polarized, and its ability to pass through the other plate is thus altered. Reflection is another very common cause of polarization. The plane of polarization is that particular plane in which a ray of polarized light incident at the polarizing angle is most copiously reflected. When the polarization is produced by reflection the plane of reflection is the plane of polarization. According to Fresnel's theory, which is that generally received, the vibrations of light polarized in any plane are perpendicular to that plane. The vibrations of a ray reflected at the polarizing angle are accordingly to be regarded as perpendicular to the plane of incidence and reflection, and therefore as parallel to the reflecting surface. Polarized light



Polarization of light.

cannot be distinguished from common light by the naked eye; and for all experiments in polarization two pieces of apparatus must be employed—one to produce polarization, and the other to show it. The former is called a polarizer, the latter an analyzer; and every apparatus that serves for one of these purposes will also serve for the other. One such apparatus is shown in the article Polariscopes. The usual process in examining light with a view to test whether it is polarized, consists in looking at it through the analyzer, and observing whether any change of brightness occurs as the analyzer is rotated. There are two positions, differing by 180° , which give a minimum of light, and the two positions intermediate between these give a maximum of light. The extent of the changes thus observed is a measure of the completeness of the polarization of light. Very beautiful colors may be produced by the peculiar action of polarized light; as for example, if a piece of selenite (crystallized gypsum) about the thickness of paper is introduced between the polarizer and analyzer of any polarizing arrangement, and turned about in different directions, it will in some positions appear brightly colored, the color being most decided when the analyzer is in either of the two critical positions which give respectively the greatest light and the greatest dark-

ness. The color is changed to its complementary by rotating the analyzer through a right angle; but rotation of the selenite, when the analyzer is in either of the critical positions, merely alters the depth of the color without changing its tint, and in certain critical positions of the selenite there is a complete absence of color. A different class of appearances are presented when a plate, cut from a uniaxial crystal by sections perpendicular to the axis, is inserted between the polarizer and the analyzer. Instead of a broad sheet of uniform color, there is exhibited a system of colored rings, interrupted when the analyzer is in one of the two critical positions by a black or white cross. Observations of this phenomenon affords in many cases an easy way of determining the position of the axis of the crystal, and is therefore of great service in the study of crystalline structure. Crystals are distinguished as dextro-gyrate or lævo-gyrate, according as their colors ascend by a right-handed or left-handed rotation of the analyzer horizontally. Glass in a state of strain exhibits coloration when placed between a polarizer and analyzer, and thus we can investigate the distribution of the strain through its substance. Unannealed glass is in a state of permanent strain. A plate of ordinary glass may be strained by a force applied to its edges by means of a screw. The state of strain may be varied during the examination of the plate by polarized light. A plate of quartz (a uniaxial crystal) cut at right angles to the optic axis exhibits, when placed between an analyzer and polarizer, a system of colored rings like any other uniaxial crystal; but we find that the center of the rings, instead of having a black cross, is brightly colored—red, yellow, green, blue, etc., according to the thickness of the plate.

POLE, the name given to either extremity of the axis round which the earth revolves. The northern one is called the north pole, and the southern the south pole. Each of these poles is 90° distant from every part of the equator. In astronomy, the name is given to each of the two points in which the axis of the earth is supposed to meet the sphere of the heavens, forming the fixed point about which the stars appear to revolve. In a wider sense a pole is a point on the surface of any sphere equally distant from every part of the circumference of a great circle of the sphere; or a point 90° distant from the plane of a great circle, and in a line passing perpendicularly through the center, called the axis. Thus the zenith and nadir are the poles of the horizon. So the poles of the ecliptic are two points of the sphere whose distance from the poles of the world is equal to the obliquity of the ecliptic, or they are 90° distant from every part of the ecliptic. Pole, in physics, is one of the points of a body at which its attractive or repulsive energy is concentrated, as the poles of a magnet, the north pole of a needle, the poles of a battery.

POLE, Perch, or Rod, a measure of length containing $16\frac{1}{2}$ feet or $5\frac{1}{2}$ yards. Sometimes the term is used as a super-

ficial measure, a square pole denoting $5\frac{1}{2} \times 5\frac{1}{2}$ yards, or $30\frac{1}{4}$ square yards.

POLE-AXE, an axe attached to a pole or handle of which the length varies considerably. It was formerly used by mounted soldiers, and in the navy for boarding purposes.

POLECAT, a name common to several species of carnivora of the weasel family. The common polecat is about 17 inches long, and the tail 6 inches. The color is dark brown. It is a nocturnal animal, sleeping during the day and searching for its prey at night. It is especially de-



Polecat.

structive to poultry, rabbits, and game. Frogs, toads, newts, and fish are often stored as food by this voracious animal. It has glands secreting a fetid liquor, somewhat like that of the American skunk, which it ejects when irritated or alarmed.

POLEMICS, the art or practice of disputation generally, but in a special sense that branch of theological learning which pertains to the history or conduct of ecclesiastical controversy.

POLE'OSCOPE, a sort of stand or frame high enough to rise above a parapet or other similar object, having a plane mirror at top so fitted as to reflect any scene upon another mirror below, and thus enable a person to see a scene in which he is interested without exposing himself.

POLE-STAR, the star α of the constellation Ursa Minor, situated about $1^\circ 20'$ from the north celestial pole, round which it thus describes a small circle. It is of the second magnitude, and is of great use to navigators in the northern hemisphere. Two stars called the pointers, in the constellation Ursa Major (the Great Bear, commonly called the Plough), always point in the direction of the pole-star, and enable it to be found readily.

POLICE (po-lēs'), the system instituted by a community to maintain public order, liberty, and the security of life and property. In its most popular acceptance the police signifies the administration of the municipal laws and regulations of a city or incorporated town or borough. The primary object of the police system is the prevention of crime and the pursuit of offenders; but it is also subservient to other purposes, such as the suppression of mendicancy, the preservation of order, the removal of obstructions and nuisances, and the enforcing of those local and general laws which relate to the public health, order, safety, and comfort. The term is also applied to the body of men by

whom the laws and regulations are enforced.

POLIGNAC (pol-in-yák), Jules Auguste Armand Marie, Prince de, a French statesman, belonging to an ancient French family, born at Paris 1780, died at St. Germain 1847. After the restoration he was appointed adjutant-general to the king, and entered the chamber of peers. In 1820 he obtained from the pope the title of a Roman prince. In 1823 he succeeded Châteaubriand as ambassador at London; but after the accession of Charles X. spent the greater part of his time in Paris. He was successively minister of foreign affairs and president of the council. At the revolution of 1830 he was apprehended and condemned to perpetual imprisonment. He remained in the fortress of Ham till the amnesty of 1836 allowed him to take up his residence in England. He was ultimately permitted to return to France. He was the author of *Considérations Politiques* (1832). Several other members of the family were men of some note.

POLISHING is the name given to the process by which the surface of a material is made to assume a perfectly smooth and glossy appearance, usually by friction. The article to be polished must first be made smooth and even, after which the polishing begins. In the case of wood the process is commonly effected by rubbing with French polish (which see). In metals, by polishing-steel or blood-stone, or by wood covered over with leather, and on which pulverized tripoli, chalk, tin-putty, etc., is sprinkled. In glass and precious stones, by tin-putty and lead siftings; in marble, by tin-putty and tripoli; in granite and other hard stones, by tripoli and quicklime.

POLISHING-POWDER, a preparation of plumbago for polishing iron articles, also a composition variously made up for cleaning gold and silver plate. See Plate-powder.

POLISHING-PLATE, a gray or yellowish slate, composed of microscopic infusoria, found in the coal-measures of Bohemia and in Auvergne, and used for polishing glass, marble, and metals.

POLITICAL ECONOMY, the science of the social ordering of wealth, or the science which has as its aim the investigation of the social conditions regulating the production, distribution, exchange, and consumption of wealth, the term wealth being understood to mean all articles or products possessing value in exchange. While, however, political economy is susceptible of wide definition on these lines, the exact scope of the science within the terms of the definition has been the subject of much confused debate. From the nature of the actual conditions of the production and regulation of wealth, and the place of the systematic examination of these as departmental to a larger science investigating the natural laws of the formation and progress of civilized communities, it is impossible to sunder it entirely from physical, intellectual, and moral considerations tending to enlarge indefinitely its scope. The varying extent to which these elements have entered into the treatment of the sub-

ject by economists has given rise to controversy not only as to whether economics is to be considered as a physico-mental or a purely mental science, but even as to its claim to be considered an independent science at all. By most economists it is urged, that as the reasoned and systematic statement of a particular class of facts it may rightly claim to be considered a science, while, as dealing with inanimate things only incidentally as the measure of motives of desire, it is to be classed with the moral or social sciences. Of more importance, as affecting the whole history of the science, have been the questions arising from the method employed in economic inquiry. The modern English school of economists, including the names of Adam Smith, Ricardo, Mill, Cairns, Fawcett, and Marshall, have been mainly guided by the deductive method, its more extreme representatives, such as Senior, asserting this method to be the only one applicable to the science. In point of fact political economy has necessarily availed itself of both methods. It has been deductive in so far as it has assumed at the outset certain hypotheses, and derived from these by a dialectical process the guiding principles of the science; but even the older economists, working under the immediate influence of the mathematico-physical sciences chiefly, cannot be justly accused of having overlooked, though they tended to underestimate, the necessity of supplementing deduction by induction. The hypothesis on which the economic system was founded, was that in the economic sphere the principal motive of human action was individual self-interest, leading men to seek to obtain the greatest amount of wealth with the least expenditure of effort; this hypothesis being followed out to its logical conclusions, under assumed conditions of perfectly free competition, in connection with the facts of the limitations of the earth's extent and reproductiveness, and the theory of a tendency in the race to multiply to an incalculable extent in the absence of natural or artificial obstacles. On this basis theories of value, rent, and population were formed, having the character of laws, but of laws which were hypothetical merely—true only under the assumed conditions of an environment in which competition was free and frictionless, unhampered by inertness, ignorance, restrictive customs, and the like. In this respect the method adopted and the results arrived at found analogy in those physical sciences the laws of which are only applicable in actual fact under large and variable modification. There was, however, an indisputable tendency among the earlier economic writers to regard these hypothetical laws as in a greater degree representative of actual fact than they were, and even, when the actual facts fell short of the theoretic conditions, to regard these as prescriptive and regulative. The ethical protest against this tendency found a strong support in the development of the group of biological sciences, opening up new conceptions of organic life and growth; and as the result of these and other influences the

old rigidity in the application of theory has largely disappeared. Where the older economist tended to look upon the subject-matter of economics as more or less constant and furnishing laws of universal application, the modern economist, having regard to the complexity and variability of human motives and the development of the race both in the matter of character and institutions, has come to recognize that the abstract conception of a frictionless competitive atmosphere, in which self-interested motives worked with mechanical regularity, can never bear other than a qualified application to actual economic conditions, and that laws relating to the economic aspects of life at one stage of human development seldom apply at another without large modification. He realizes clearly what the older economist only imperfectly perceived, and even more imperfectly expressed, that the system they were elaborating was to be considered rather as an instrument to assist in the discovery of economic truth, than a body of truths representing any actual or desirable social state. When regarded in this light—as a means to assist in the disentanglement of the complex motives operative in actual economic relations—the isolation of one set of economic forces, and the tracing of the logical issues of these, becomes of the highest value, despite the danger in careless use of neglecting necessary modification and of translating its hypothetical statements into prescriptions for conduct and social organization. It has been this neglect, the assumption of didactic authority, and the extent of the modifications often necessary in the practical application of theory which have tended to bring the older school into discredit at the hands of Comte, Cliff Leslie, Ruskin, and a large number of foreign economists—some complaining with Comte of the tendency to vicious abstractions, and the impossibility of isolating to any useful end the special phenomena of economics from other social phenomena some, like the German and American; historic schools, arguing that it is desirable and necessary to reason direct from historic facts to facts without the intervention of any formal economic theory. So far, however, the opponents of the older method of dealing with economic problems, though they have accomplished an admirable work in clearing the older economics of many confusions and misapprehensions, have failed to supply a superior method of analyzing the phenomena constituting the subject-matter of the science, while many of them have not scrupled to avail themselves largely of the results arrived at by the method they condemn.

POLITICAL OFFENSES, are those offenses considered injurious to the safety of the state, or such crimes as form a violation of the allegiance due by a subject to the recognized supreme authority of his country. In modern times the crimes considered political offenses have varied at different periods and in different states. In Britain the most serious political offenses are termed treason (see Treason and Treason-Felony), and those of a lighter nature

which do not aim at direct and open violence against the laws or the sovereign, but which excite a turbulent and discontented spirit which would likely produce violence, are termed sedition. (See Sedition.) Political offenders of foreign countries are by English law not included in extradition treaties. In the United States also, and in most of the countries of Europe, the extradition treaties do not include the giving up of political offenders.

POLITICS, in its widest extent, is both the science and the art of government, or the science whose subject is the regulation of man in all his relations as the member of a state, and the application of this science. In other words it is the theory and the practice of obtaining the ends of civil society as perfectly as possible. In common parlance we understand by the politics of a country the course of its government, more particularly as respects its relations with foreign nations.

POLK (pōk), James Knox, president of the United States of North America from 1845-49, was born in 1795 in North Carolina; died at Nashville 1849. He studied law and entered congress as representative of Tennessee in 1825. He was speaker of the House of repre-



James K. Polk

sentatives from 1835 to 1838. His advocacy of the annexation of Texas led to his election as president in 1844. The annexation of Texas, the Mexican war, the acquisition of upper California and New Mexico, and the settlement of the Oregon boundary were the chief events of his term of office.

POLKA, a species of dance of Bohemian origin, but now universally popular, the music to which is in $\frac{2}{4}$ time, with the third quaver accented. There are three steps in each bar, the fourth beat being always a rest.

POLLACK, a fish of the cod family.



Pollack.

The pollack belongs to the same genus as the whiting, the members of this genus possessing three dorsal fins and two anals. The lower jaw is longer than

the upper jaw, and the tail is forked, but not very deeply. It inhabits the Atlantic Ocean, and is common on all the British coasts, as well as on the shores of Norway. The northern coasts of Britain appear to be those on which these fishes are most abundant. The pollacks are gregarious in habits, and swim in shoals. It bites keenly at either bait or fly, and affords good eating.

POLLEN, the male element in flowering plants; the fine dust or powder which by contact with the stigma effects the fecundation of the seeds. To the naked eye it appears to be a very fine powder, and is usually inclosed in the cells of the anther; but when examined with the microscope it is found to consist of hollow cases, usually spheroidal, filled with a fluid in which



Pollen grains (magnified).

are suspended drops of oil from the 20,000th to the 30,000th of an inch in diameter, and grains of starch five or six times as large. Impregnation is brought about by means of tubes (pollen-tubes) which issue from the pollen-grains adhering to the stigma, and penetrate through the tissues until they reach the ovary. The cut shows the pollen-grains of (1) manna-ash, (2) clove, (3) strong-scented lettuce.

POLO, Marco, Venetian traveler, was born about the year 1256. His father Nicolo was the son of Andrea Polo, a patrician of Venice. Shortly before Marco's birth, Nicolo with his brother Matteo set out on a mercantile expedition, and ultimately arrived at Kienfu on the frontiers of China, where they were favorably received by Kubilai, the grand-khan of the Mongols. In 1266 the khan sent the brothers on a mission to the pope, and they arrived in Venice in 1269. Two years later they again set out for the east, this time accompanied by the young Marco. After reaching the court of Kubilai, Marco rapidly learned the language and customs of the Mongols, and became a favorite with the khan, who employed him on various missions to the neighboring princes. Soon afterward he was made governor of Yangtchou, in eastern China, an appointment he held for three years. In 1292 the three Polos accompanied an escort of a Mongolian princess to Persia. After arriving at Teheran they heard of Kubilai's death, and resolved to return home. They reached Venice in 1295. In the following year Marco Polo took part in the naval battle of Curzola, in which he was taken prisoner. During his captivity he dictated to a fellow-prisoner, Rustichello or Rusticiano of Pisa, an account of all his travels, which was finished in 1298. After his liberation he returned to Venice, where he died in 1323. His book—known as the Book of Marco Polo—created an immense sensation among the scholars of his time, and was regarded by many as pure fiction. It made known to Europeans the existence of many nations of which they were formerly totally ignorant, and

created a passion for voyages of discovery.

POLONAISE, is a polish national dance, which has been imitated, but with much variation, by other nations. The Polonaise, in music, is a movement of three crochets in a bar, characterized by a seeming irregularity of rhythm, produced by the syncopation of the last note in a bar with the first note of the bar following, in the upper part or melody, while the normal time is preserved in the bass.

POLTA'VA, or **PULTAWA**, a government of Russia, bounded by Czernigov, Kharkov, Ekaterinoslav, Kherson, and Kiev; area, 19,265 sq. miles. It is one of the most fertile and best cultivated portions of the Russian empire, and grows large quantities of grain. Pop. 2,520,887.—Poltava, the capital, at the confluence of the Poltava with the Worskla, has straight and broad streets, a cathedral, important educational institutions, etc. As a place of trade Poltava derives importance from the great fair held on 20th July each year. Wool is the great staple of trade. Horses, cattle, and sheep are likewise bought and sold in great numbers. It contains a monument to Peter the Great, who here defeated Charles XII. in 1709. Pop. 53,060.

POLYANDRIA, or **POLYANDRY**, denotes the custom of one woman having several husbands (generally brothers) at one time. This system prevailed among the Celts of Britain in Cæsar's time, and occurs yet in southern India, in Tibet, among the Eskimo, the Aleutians, some tribes of American Indians, and in the South seas. The practice is believed to have had its origin in unfertile regions in an endeavor to check the undue pressure of population on the means of subsistence.

POLYANTHUS, a beautiful and favorite variety of the common primrose, a native of most parts of Europe, growing in woods and copses in a moist clayey soil. The leaves are obovate,



Garden polyanthus.

oblong, toothed, rugose, and villous beneath. The flowers are in umbels on a scape or flower stalk 3 to 6 inches or more in length. In addition to propagating from seeds polyanthus may also be readily increased by division.

POL'YCARP, one of the Christian fathers, and, according to tradition, a disciple of the apostle John, was born probably in Smyrna about 69 or 70; martyred 155 or 156. According to a legendary fragment ascribed to a writer named Pionius, he was consecrated bishop of his native city by St. John.

During the persecution under Marcus Aurelius, Polycarp was seized and brought before the Roman proconsul at Smyrna. Having refused to renounce his faith he was condemned to the flames. He wrote several letters, which were current in the early church, but have all perished except one addressed to the Philippians, which appears to have been written about 115, and is valuable for its quotations from the apostolic writings.

POLYCRATES, Greek tyrant or absolute ruler of Samos during the time of the elder Cyrus. He made himself master of the island by violence, and having secured absolute sway seized upon several of the neighboring islands and some towns upon the mainland. In 522 B.C. the Persian satrap Oroetes treacherously invited Polycrates to his palace and there crucified him. Polycrates seems to have had much taste for learning and the arts, and greatly promoted the refinement of the Samians.

POLYGAMY consists in a man's having more than one wife at the same time. In ancient times polygamy was practiced by all the eastern nations, and was sanctioned or at least tolerated by their religions. It was permitted to some extent among the Greeks, but entirely disappeared with the later development of Greek civilization. To the ancient Romans and Germanic races it was unknown. It prevailed among the Jewish patriarchs both before and under the Mosaic law. But in the New Testament we meet with no trace of it. Polygamy has never been tolerated among Christians, although the New Testament contains no injunction against it. It was, however, practiced by the Mohammedans and Mormons (up till recently). A statute of Edward I. treated polygamy as a capital crime.

POLYGLOT, a work which contains the same matter in several languages. It is more particularly used to denote a copy of the Holy Scriptures in which two, three, or more translations are given, with or without the original. The first great work of the sort is the Complutensian polyglot, prepared under the direction of Cardinal Ximenes, and splendidly printed (1514-17), in 6 folio volumes at Alcalá de Henares, called in Latin *Complutum*, whence the name of the work. It contains the Hebrew text of the Old Testament, with the Vulgate, the Septuagint, a literal Latin translation, and a Chaldee paraphrase (which is also accompanied by a Latin translation). Another celebrated polyglot is that of Antwerp, called the Royal Bible, because Philip II. of Spain bore part of the cost of publication. It was conducted by the learned Spanish theologian, Benedict Arias Montanus, assisted by other scholars. It appeared at Antwerp in 8 folio volumes (1569-72). The Paris polyglot appeared in 1654, in 10 folio volumes. The London or Walton's polyglot, in ten languages, appeared in 6 volumes folio, with two supplementary volumes (London, 1654-57). It was conducted under the care of Bryan Walton, afterward Bishop of Chester, and contains all that is in the Paris polyglot, but with many additions and improvements. It contains the original text

according to several copies, with an Ethiopic and a Persian translation, and the Latin versions of each. Bagster's Polyglot folio, London (1831), gives eight versions of the Old Testament and nine of the new.

POLYGON, in geometry, a plane figure of many angles and sides, or at least of more than four sides. A polygon of five sides is termed a pentagon; one of six sides, a hexagon; one of seven sides, a heptagon, and so on. Similar polygons are those which have their several angles equal each to each, and the sides about their equal angles proportional. All similar polygons are to one another as the squares of their homologous sides. If the sides, and consequently the angles, are all equal the polygon is said to be regular; otherwise, it is irregular. Every regular polygon can be circumscribed by a circle or have a circle inscribed in it.—Polygon of forces, in mechanics, the name given to a theorem which is as follows:—If any number of forces act on a point, and a polygon be taken, one of the sides of which is formed by the line representing one of the forces, and the following sides in succession by lines representing the other forces in magnitude, and parallel to their directions, then the line which completes the polygon will represent the resultant of all the forces.

POLYHEDRON, in geometry, a body or solid bounded by many faces or planes. When all the faces are regular polygons similar and equal to each other the solid becomes a regular body. Only five regular solids can exist, namely, the tetrahedron, the hexahedron, the octahedron, the dodecahedron, and the icosahedron.

POLYNESIA, a general name for a number of distinct archipelagoes of small islands scattered over the Pacific ocean, extending from about lat. 35° n. to 35° s., and from lon. 135° e. to 100° w., the Philippines, New Guinea, Australia, and New Zealand being excluded. (See Oceania.) The islands are distributed into numerous groups, having a general direction from n.w. to s.e. The groups north of the equator are the Pelew, Ladrone, or Marianne, Caroline, Marshall, Gilbert or Kingsmills, Fanning, and Hawaii or the Sandwich islands. South of the equator are New Ireland, New Britain, Solomon islands, New Hebrides, Fiji, New Caledonia, Navigator, Friendly, Cook's or Harvey, and the Society islands, the Low Archipelago, the Marquesas islands, and the isolated Easter island. The term Polynesia is sometimes restricted to the groups most centrally situated in the Pacific; the New Hebrides, Solomon islands, New Britain, New Ireland (Bismark Archipelago), etc., being classed together as Melanesia, whereas the Carolines, Ladrone, Marshall islands etc., form Micronesia. The predominating race, occupying the central and eastern portion of Polynesia, is of Malay origin, with oval faces, wide nostrils, and large ears. The hair and complexion vary greatly, but the latter is often a light brown. Their language is split up into numerous dialects. The other leading race is of negroid or Papuan origin, with negro-like features and

crisp mop-like hair. They are confined to Western Polynesia, and speak a different language, with numerous distinct dialects.

POLYPHEMUS, in Greek mythology, the most famous of the Cyclops, who is described as a cannibal giant with one eye in his forehead, living alone in a cave of Mount Ætna and feeding his flocks on that mountain. Ulysses and his companions having been driven upon the shore by a storm, unwarily took refuge in his cave. Polyphemus, when he returned home at night, shut up the mouth of the cavern with a large stone, and by the next morning had eaten four of the strangers, after which he drove out his flocks to pasture, and shut in the unhappy captives. Ulysses then contrived a plan for their escape. He intoxicated the monster with wine, and as soon as he fell asleep bored out his one eye with the blazing end of a stake. He then tied himself and his companions under the bellies of the sheep, in which manner they passed safely out in the morning. Polyphemus was the despised lover of the nymph Galatea.

POLYPODIA'CEÆ, a natural order of ferns, which may be taken as the type of the whole. They constitute the highest order of acrogenous or cryptogamic vegetation, and are regarded as approaching more nearly to cycadaceous gymnosperms than to any other group of the vegetable kingdom. They are usually herbaceous plants with a permanent stem, which either remains buried or rooted beneath the soil, or creeps over the stems of trees, or forms a scarcely movable point of growth, round which new leaves are annually produced in a circle, or it rises into the air in the form of a simple stem, bearing a tuft of leaves at its apex and sometimes attaining the height of 40 feet, as in the tree-ferns.

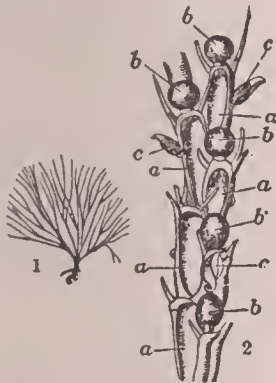
POLYPUS, in medicine, a name given to tumors chiefly found in the mucous membranes of the nostrils, throat, ear, and uterus; rarely in the stomach, bladder, and intestines. Polypi differ much in size, number, mode of adhesion, and nature. One species is the mucous, soft, or vesicular, because its substance consists of mucous membrane with its embedded glands; another is called the hard polypus, and consists of fibrous tissue. Polypi may be malignant in character, that is, of the cancerous type.

POLYTECHNIC SCHOOL. See *Ecole Polytechnique*.

POLYTHEISM, the belief in, and worship of, a plurality of gods; opposed to monotheism, the belief in, and worship of one god. It is still a matter of debate whether polytheism is a primary form of human belief, or a degeneration of an original monotheistic idea. It is argued, on the one hand, that the sense of personal dependence, the feeling that there was an undefined power, a mysterious something around and above him, did not primarily present itself to the mind of man except under a form of unity. His earliest religion would therefore be of a monotheistic character, but of a highly unstable nature, and eminently liable, among races of rude faculties and little power of abstraction, to assume a polytheistic form, the idea

of one Supreme Being being readily obscured by the multiplicity of the visible operations of that being on earth. Those who affirm that polytheism was a primary form of religious belief argue that man, ignorant of the nature of his own life, and of the nature, origin, and properties of other objects, could at first only attribute vaguely to all visible things the same kind of conscious existence as that which belonged to himself. Thus the sun, moon, and stars would all be living beings; and their influence, from the absence of any idea of a natural order, would be seen in the working of the material world, and in all the accidents of human life. As being beyond human control, and as affecting the condition of men, they would be loved or feared; and with the growth of the idea that they might be propitiated or appeased the system of polytheism would be complete. See Monotheism and Mythology.

POLYZO'A, a class of Mollusca or Lower Mollusca, generally known by the popular names of "sea-mosses" and "sea-mats." They are invariably compound, forming associated growths or colonies of animals produced by gemmation from a single primordial individual, and inhabit a polyzoarium, or aggregate of cells, corresponding to the polypidom of the composite hydroids.



A—Polyzoan.

1, Natural size. 2, Portion of same magnified.
a, Cells. b, Ovicells. c, Avicularia.

The polypide, or individual polyzoan, resides in a separate cell or chamber, has a distinct alimentary canal suspended freely in a body cavity, and the reproductive organs contained within the body. The body is inclosed in a double-walled sac, the outer layer of which is chitinous or calcareous, and the inner a delicate membranous layer. On the ectocyst are seen certain peculiar processes called "bird's-head processes," or avicularia, from their shape, the use of which is unknown. The mouth-opening at the upper part of each cell is surrounded by a circle of hollow ciliated tentacles, which perform the function of respiration, and the cell may be closed by a sort of valve called the epistome. All the Polyzoa are hermaphrodite. In many cases there are ovicells or sacs into which the fertilized ova pass. From these proceed free-swimming ciliated embryos which develop into polypides. Continuous gemmation exists in all. They are all aquatic in their habits; the marine Polyzoa being common to all seas, but the fresh-water genera are mostly confined to the north temperate zone.

POMEGRANATE (pom'gra-nāt), a dense spiny shrub, from 8 to 20 feet high, supposed to have belonged originally to the north of Africa, and subsequently introduced into Italy. It was called by the Romans Carthaginian apple. The leaves are opposite, lanceo-



Pomegranate.

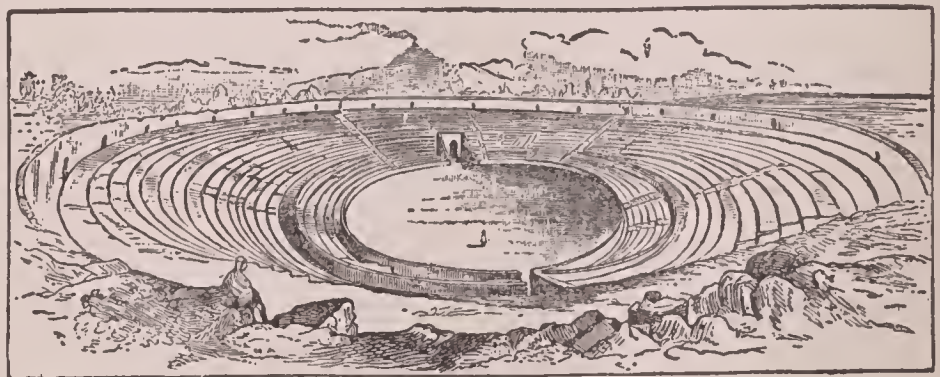
late, entire, and smooth; the flowers are large and of a brilliant red; the fruit is as large as an orange, having a hard rind filled with a soft pulp and numerous red seeds. The pulp is more or less acid and slightly astringent. The pomegranate is extensively cultivated throughout Southern Europe, and sometimes attains a great size.

POMERA'NIA, a province of Prussia, bounded by the Baltic, Mecklenburg, Brandenburg, and West Prussia; area, 11,622 sq. miles. The principal rivers are the Oder, Persante, and Stolpe. The soil is generally sandy and indifferent, but there are some rich alluvial tracts, producing a quantity of grain. Flax, hemp, and tobacco are also cultivated. Pop. 1,634,832.

POMPADOUR (pon-pā-dör), Jeanne Antoinette Poisson, Marquise de, the mistress of Louis XV., was born in 1721, and was said to be the daughter of the farmer-general Lenormand de Tournem, who at his death left her an immense fortune. In 1741 she married her cousin, Lenormand d'Etiolles. A few years later she succeeded in attracting the attention of the king, and soon entirely engrossed his favor. In 1745 she appeared at court as the Marquise

portant offices, and she is said to have brought about the war with Frederick II. She died in 1764, at the age of forty-four, hated and reviled by the nation.

POMPEII (pom-pā'yē), an ancient city of Italy, in Campania, near the Bay of Naples, about 12 miles southeast from the city of that name, and at the base of Mount Vesuvius on its southern side. Before the close of the republic, and under the early emperors, Pompeii became a favorite retreat of wealthy Romans. In A.D. 63 a fearful earthquake occurred, which destroyed a great part of the town. The work of rebuilding was soon commenced, and the new town had a population of some 30,000 when it was overtaken by another catastrophe on 24th August, A.D. 79. This consisted in an eruption of Mount Vesuvius, which suddenly belched forth tremendous showers of ashes, red-hot pumice-stone, etc., so as to overwhelm the city for a considerable depth. In 1906 an eruption took place accompanied by earthquakes, which, compared with other great eruptions, was one of the most important in its history. Many towns were destroyed by lava. Pompeii was threatened for a time, but only a few houses were destroyed. In Naples, 12 miles from the volcano, the fall of ashes was so great that it caused the death and injury of many people. The number of lives lost was over 300, and the loss of property was incalculable. Pompeii was consigned to oblivion during the middle ages, and it was not until 1748, when a peasant in sinking a well discovered a painted chamber with statues and other objects of antiquity, that anything like a real interest in the locality was excited. Excavations were now prosecuted and in 1755 the amphitheater, theater, and other parts were cleared out. Under the Bourbons the excavations were carried out on a very unsatisfactory plan. Statues and articles of value alone were extricated, while the buildings were suffered to fall into decay or covered up again. To the short reign of Murat (1808-15) we are indebted for the excavation of the Forum, the town walls, the Street of Tombs, and many private houses. Latterly the government of Victor Emmanuel assigned \$12,500 annually for the prosecution of the excavations,



Amphitheatre at Pompeii.

de Pompadour. Here she at first posed as the patroness of learning and the arts, but with the decay of her charms she devoted her attention to state affairs. Her favorites filled the most im-

portant offices, and she is said to have brought about the war with Frederick II. She died in 1764, at the age of forty-four, hated and reviled by the nation.

west. The circumference of the walls amounts to 2925 yards. The area within the walls is estimated at 160 acres; greatest length, $\frac{3}{4}$ mile; greatest breadth $\frac{1}{4}$ mile. There are eight gates. The streets are straight and narrow and paved with large polygonal blocks of lava. The houses are slightly constructed of concrete, or occasionally of bricks. Numerous staircases prove that the houses were of two or three stories. The ground floor of the larger houses was generally occupied by shops. Most of the larger houses are entered from the street by a narrow passage (vestibulum) leading to an internal hall (atrium), which provided the surrounding chambers with light and was the medium of communication; beyond the latter is another large public apartment termed the tablinum. The other portion of the

greeted him with the surname of Magnus (Great). Pompey demanded a triumph, to which Sulla reluctantly consented. He entered Rome in triumph in September 81, and was the first Roman permitted to do so without possessing a higher dignity than that of equestrian rank. After the death of Sulla, Pompey put an end to the war which the revolt of Sertorius in Spain had occasioned, and in 71 obtained a second triumph. In this year, although not of legal age and without official experience, he was elected consul with Crassus. In 67 he cleared the Mediterranean of pirates, and destroyed their strongholds on the coast of Cilicia. In the four years, 65-62, he conquered Mithridates, Tigranes, and Antiochus, king of Syria. At the same time he subdued the Jews and took Jerusalem by storm. He returned to

were filled with Cæsar's enemies. Through his influence Cæsar was proclaimed an enemy to the state, and his rival was appointed general of the army of the republic. Cæsar crossed the Rubicon in 49 (see Cæsar), and in sixty days was master of Italy without striking a blow. Pompey crossed over to Greece, and in this country, on the plains of Pharsalia, occurred the decisive battle which made Cæsar master of the Roman world. Pompey fled to Egypt, where he hoped to find a safe asylum. The ministers of Ptolemy betrayed him, and he was stabbed on landing by one of his former centurions in B.C. 48.

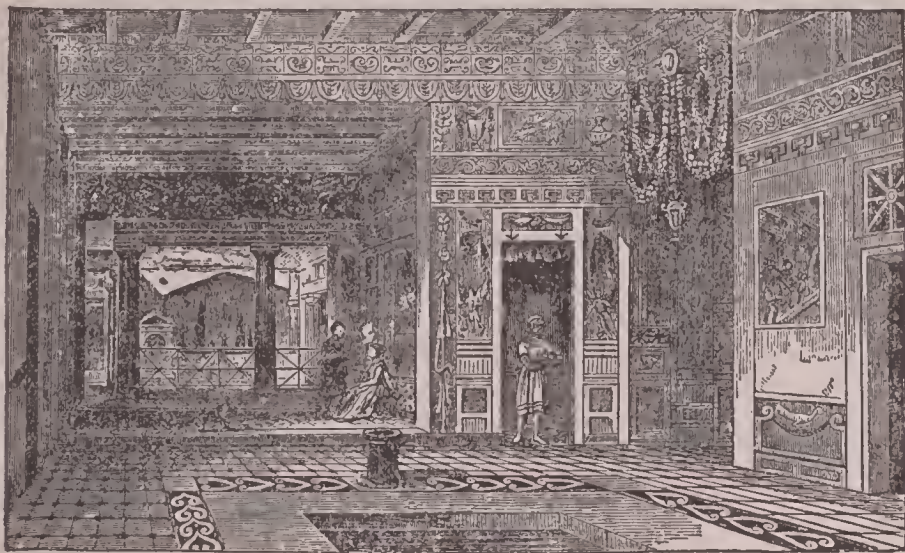
POMPEY'S PILLAR, a celebrated column, standing on an eminence about 1800 feet to the south of the present walls of Alexandria in Egypt. It consists of a Corinthian capital, shaft, base, and pedestal. The total height of the column is 104 feet; the shaft, a monolith of red granite, is 67 feet long, and 9 feet in diameter below and not quite 8 at top. It is named from the Roman prefect Pompeius, who erected it in honor of Diocletian about or soon after 302 A.D.

PONCE DE LEON (pon'the de le-on'), Juan, one of the early Spanish discoverers in America, born about 1460, died at Cuba 1521. He accompanied Columbus on his second expedition in 1493, and was sent by Ovando to conquer the island of Porto Rico. Having there amassed great wealth, and received information of an island situated to the north, he discovered the country, to which he gave the name of Florida. Ponce returned to Spain in 1513, and was appointed by Ferdinand governor of the island of Florida, as he called it, on condition that he should colonize it. In 1521 he embarked nearly all his wealth in two ships, and proceeded to take possession of his province. He was, however, met with determined hostility by the natives, who made a sudden attack upon the Spaniards, and drove them to their ships. In the combat Ponce de Leon was mortally wounded.

PONDICHERY, a town, capital of the French East Indian settlement of the same name, on the east or Coromandal coast, 85 miles south by west from Madras. Its territory is surrounded on the land side by the British district of South Arcot, and has an area of 115 sq. miles; pop. 182,000.

PONDOLAND, a maritime territory of Cape Colony abutting on Natal, 90 miles from n.e. to s.w., and about 50 from n.w. to s.e. Pop. about 200,000. It was the last remnant of independent Kaffraria, became a British protectorate in 1884, and was annexed to the Cape in 1894.

PONTEVEDRA (pon-te-vā'drá), a town in Northwest Spain, capital of a province of the same name. It is surrounded by an old wall; consists of broad, well-paved streets, and well-built houses of granite, and has manufactures of cotton, velvet, woolen and cotton cloth, hats, leather, etc. Pop. 20,012.—The province produces in abundance corn, rye, wheat and millet, flax, fruit, and wine, and rears great numbers of cattle. Area, 1730 sq. miles; pop. 463,564.

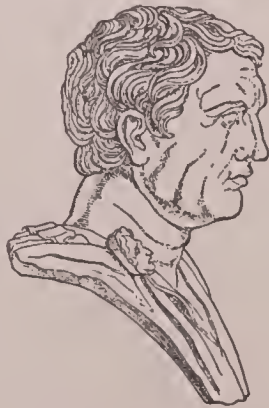


Pompeii—House of the Tragic Poet, so called.

house comprised the private rooms of the family. All the apartments are small. The shops were small and all of one character, having the business part in front and one or two small chambers behind, with a single large opening serving for both door and window. The chief public buildings are the so-called Temple of Jupiter, the Temple of Venus, the Basilica, the Temple of Mercury, the Curia, and the Pantheon or Temple of Augustus. There are several interesting private buildings scattered through the town, including the villa of Diomedes, the house of Sallust, and the house of Marcus Lucretius. The Museum of Naples owes many of its most interesting features to the ornaments, etc., found in the public and private edifices above mentioned.

POMPEY, in full Cneius Pompeius Magnus, a distinguished Roman, born B.C. 106, was the son of Cneius Pompeius Strabo, an able general. In B.C. 89 he served with distinction under his father in the war against the Italian allies. In the struggle between Marius and Sulla, Pompey raised three legions to aid the latter, and regained all the territories of Africa which had forsaken the interest of Sulla. This success excited the jealousy of Sulla, who recalled him to Rome. On his return Sulla

Italy in 62 and disbanded his army, but did not enter Rome until the following year, when he was honored with a third triumph. Pompey, in order to strengthen his position, united his interest with that of Cæsar and Crassus, and thus formed the first triumvirate. This agree-

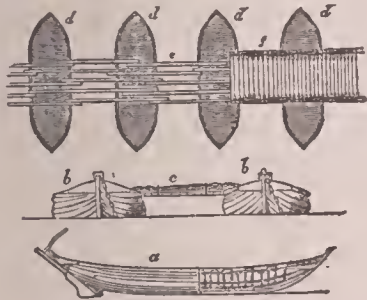


Pompey.—Antique gem.

ment was concluded by the marriage of Pompey with Cæsar's daughter Julia; but the powerful confederacy was soon broken. During Cæsar's absence in Gaul Pompey ingratiated himself with the senate, was appointed sole consul, and the most important state offices

PONTIAC, the capital of Oakland co., Mich., on the Clinton river, and the Detroit, Gr. Haven and Mil. and the Pontiac, Oxford and N. railways; 26 miles n.w. of Detroit. Within the county and a few miles from the city are over 400 lakes, with a total area of about 30,000 sq. miles, teeming with choice fish. Pop. 11,542.

PONTOON, in military engineering, a flat-bottomed boat, or any light framework or floating body used in the construction of a temporary bridge over a river. One form of pontoon, used in the British service, is a hollow tin-plate cylinder, with hemispherical ends, and divided by several longitudinal and transverse partitions to act as braces and to prevent sinking if pierced by a shot or by accident. Another is in the



Pontoon and pontoon bridge.

a. Pontoon, external and internal structure. b. End of same, supporting the roadway. c. Plan of bridge. d. Rafters for supporting the roadway. e. Rafters for supporting the roadway. f. Roadway complete

form of a decked canoe, and consists of a timber frame covered with sheet copper. It is formed in two distinct parts, which are locked together for use and dislocated for transportation, and is also divided into air-tight chambers. The name is also given to a water-tight structure or frame placed beneath a submerged vessel and then filled with air to assist in refloating the vessel; and to a water-tight structure which is sunk by filling with water and raised by pumping it out, used to close a sluiceway or entrance to a dock.

POOLE, William Frederick, American librarian, was born in Salem, Mass., in 1821. He was librarian of the Boston Mercantile library, 1852-56; then of the Athenæum, where he remained thirteen years, becoming known as one of the leading librarians of the country. He was in charge of the Cincinnati Public library in 1869-73; of the Chicago Public library in 1873-87; and of the Newberry library, Chicago, from 1887 till his death. Dr. Poole was most widely known for his admirable *Index to Periodical Literature*, of which he published enlarged editions in 1853 and in 1882. He died in 1894.

POONAH, or **PUNA**, a city and district of Hindustan, in the presidency of Bombay. It is about 119 miles east of Bombay by the Great Indian Peninsular railway. Pop. 153,320, of whom 40,000 are in the cantonments.—The district has an area of 5348 sq. miles, and a pop. of 995,074.

POOP, the aftermost and highest part of the hull in large vessels; or, a partial deck in the aftermost part of a ship above the deck proper.

POOREE, or **PURI**, a town and dis-

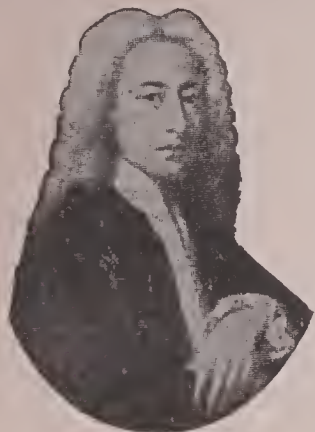
trict of India, in the province of Orissa. The town is 250 miles s.w. from Calcutta. It contains the shrine of Juggernaut, to whose worship crowds flock from every part of India. Pop. 49,334.—The district has an area of 2473 sq. miles, and a pop. of 1,017,286.

POOR RICHARD'S ALMANAC, a popular almanac published by Benjamin Franklin in 1732 and continued for twenty-five years. As "Richard Saunders" Franklin supplied in his almanacs, of which 10,000 were sold yearly, a fund of proverbs, homely wisdom and common sense of the greatest practical value to the people of this country.

POPE, the title given to the head of the Roman Catholic hierarchy. It seems to have been used at first in the early church as a title of reverence given to ecclesiastics generally, and at the present time it is applied in the Greek church to all priests. In the early Western church the title of pope was ultimately bestowed upon the metropolitan bishops, but in the struggle for pre-eminence the claim to be recognized as the only pope was enforced by the Bishop of Rome. This claim of pre-eminence was founded on the belief, supported by the early traditions of the church, that the Apostle Peter planted a church in Rome, and that he died there as a martyr. This tradition, taken in connection with the alleged pre-eminence of Peter among Christ's disciples, came to be regarded as sufficient reason for the primacy of the Bishop of Rome in the church. Consequently from the end of the 4th century the Bishop of Rome was the first among the five patriarchs or superior bishops of Christendom. A decree of the emperor Valentinian III. (445) acknowledged the Bishop of Rome as primate, but until the 8th century many measures of the popes met with violent opposition. Leo the Great (440-461) was the first to base his claims to the primacy on divine authority by appealing to Matt. xvi. 18; and he did much to establish the theory that bishops in disputes with their metropolitans had a right of appeal to Rome. The Eastern church always resisted the see of Rome, and this mainly occasioned the schism that in 1054 divided Christendom into the Greek and Roman churches. After the 8th century several circumstances contributed to open to the popes the way to supreme control over all churches. Among these were the establishment of missionary churches in Germany directly under Rome, the pseudo-Isidorian decretals, which contained many forged documents supporting the general supremacy of the Roman pontiff the gradations of ecclesiastical rank, and the personal superiority of some popes over their contemporaries. Leo the Great (440-461), Gregory I., the Great (590-604), and Leo III. (795-816), who crowned Charlemagne, all increased the authority of the papal title. Much violence and corruption prevailed in the Roman see during the middle ages. In 1059 the dignity and independence of the papal chair were heightened by the constitution of Nicolas II., placing the right of election of the pope in the hands

of the cardinals. In 1073 Gregory VII., at a Roman council, formally prohibited the use of the title of pope by any other ecclesiastic than the Bishop of Rome; he also enforced a celibate life upon the clergy, and prohibited lay investiture. The reign of Innocent III. (1198-1216) raised the papal see to the highest degree of power and dignity; and having gained almost unlimited spiritual dominion, the popes now began to extend their temporal power also. The dominions under the pope's temporal rule had at first consisted of a territory granted to the papal see by Pepin in 754, which was subsequently largely increased. The popes, however, continued to have to some extent the position of vassals of the German empire, and until the 12th century the German emperors suffered no election of pope to take place without their sanction. Innocent III., however, largely increased his territories at the expense of the empire, and the power of the emperors over Rome and the pope may now be said to have come to an end. Favorable circumstances had already made several kindgoms tributary to the papal see, which had now acquired such power that Innocent III. took upon him to depose and proclaim kings, and put both France and England under an interdict. France alone first successfully resisted the popes. In Philip the Fair Boniface VIII. found a master, and his successors between 1307 and 1377 remained under French influence, and held their courts at Avignon. Their dignity sunk still lower in 1378 when two rival popes appeared, Urban VI. and Clement VII., causing a schism and scandal in the church for thirty-eight years. This schism did much to lessen the influence of the popes in Christendom, and it subsequently received a greater blow from the Reformation. During the reign of Leo X. (1513-25) Luther, Zuinglius, and Calvin were the heralds of an opposition which separated almost half the west from the popes, while the policy of Charles V. was at the same time diminishing their power, and from this time neither the new support of the Society of Jesuits nor the policy of the popes could restore the old authority of the papal throne. The national churches obtained their freedom in spite of all opposition, and the Peace of Westphalia (1648), bringing to an end the Thirty Years' war and the religious struggle in Germany, gave public legality to a system of toleration which was in direct contradiction to the papal doctrines. The bulls of the popes were now no longer of avail beyond the states of the church without the consent of the sovereigns, and the revenues from foreign kingdoms decreased. Pius VI. (1775-98) witnessed the revolution which not only tore from him the French church, but even deprived him of his dominions. In 1801, and again in 1809, Pius VII. lost his liberty and possessions, and owed his restoration in 1814 to a coalition of temporal princes, among whom were two heretics (English and Prussian) and a schismatic (the Russian). Nevertheless he not only restored the Inquisition, the order of the Jesuits, and other religious orders,

but advanced claims and principles entirely opposed to the ideas and resolutions of his liberators. The same spirit that actuated Pius VII. actuated in like manner his successors, Leo XII. (1823-29), Pius VIII. (1829-30), and above all Gregory XVI. (1831-46). The opposition of the latter to all reforms in the



Pope.

civil relations of the papal dominions contributed greatly to the revolution of 1848, which obliged his successor, Pius IX., to flee from Rome. The power of the papacy was further weakened by the events of 1859, 1860, and 1866. And after the withdrawal of the French troops from Italy in 1870, King Victor Emmanuel took possession of Rome, and since that time the pope has lived in seclusion in the Vatican.

By the decrees of the Vatican Council of 1870 the pope has supreme power in matters of discipline and faith over all and each of the pastors and of the faithful. It is further taught by the Vatican council that when the pontiff speaks ex cathedra, that is when he, in virtue of his apostolic office, defines a doctrine of faith and morals to be held by the whole church, he possesses infallibility by divine assistance. The pope cannot annul the constitution of the church as ordained by Christ. He may condemn or prohibit books, alter the rites of the church, and reserve to himself the canonization of saints. A pope has no power to nominate his successor, election being entirely in the hands of the cardinals, who are not bound to choose one of their own body. The papal insignia are the tiara or triple crown, the straight crosier, and the pallium. He is addressed as "Your holiness."

POPE, Alexander, a celebrated English poet, was born May 21, 1688. His father was a London merchant and a devout Catholic. Soon after his son's birth the father retired to Binfield, near Windsor. Pope was small, delicate, and much deformed. His education was a desultory one. In 1711 he published his poem the *Essay on Criticism*, which was followed by *The Rape of the Lock*, a polished and witty narrative poem founded on an incident of fashionable life. His next publications were *The Temple of Fame*, a modernization and adaptation of Chaucer's *House of Fame*; *Windsor Forest*, a pastoral poem (1713); and *The Epistle of Eloisa to Abelard* (1717). From 1713 to 1726 he was engaged on a poetical translation of

Homer's works, the *Iliad* (completed in 1720) being wholly from his pen, the *Odyssey* only half. In 1728 he published his *Dunciad*, a mock heroic poem intended to overwhelm his antagonists with ridicule. It is distinguished by the excessive vehemence of its satire, and is full of coarse abuse. This was followed by *Imitations of Horace* (among the most original of his works), and by *Moral Epistles or Essays*. His *Essay on Man* was published anonymously in 1733, and completed and avowed by the author in the next year. This work is distinguished by its poetry rather than by its reasonings, which are confused and contradictory. In 1742 he added a fourth book to his *Dunciad*, in which he attacked Colley Cibber, then poet-laureate. He died on May 30, 1744, and was interred at Twickenham.

POPE, John, American soldier was born in Kaskaskia, Ill., in 1822. He saw service in the Florida Indian war and served under General Taylor in the Mexican war. He was one of President Lincoln's escort to Washington on the occasion of his first inauguration. In 1861 he was made brigadier-general. In 1862 he was called to Washington and assigned to the army of Virginia. He was utterly defeated by Stonewall



John Pope.

Jackson at the second battle of Bull Run. He returned to Washington and resigned his command. After the war he was placed in command of one of the southern military districts. In 1882 he was made major-general. He was placed on the retired list in 1886. He died in 1902.

POPLAR, a well-known genus of hardy deciduous trees, with both barren and fertile flowers in catkins, stamens four to thirty, leaves alternate, broad, with long and slender foot-stalks flattened vertically, the leaves having generally more or less of a tremulous motion. About eighteen species have been observed, natives of Europe, central and northern Asia, and North America. Some of the poplars are the most rapid growers of all hardy forest trees. They thrive under a variety of conditions as regards soil, etc., but do best in damp situations. The timber of the poplar is white, light, and soft, and not very valuable.

POPOCATEPETL, an active volcano in Mexico, in the province of Puebla; long. 98° 33' w.; lat. 18° 36' n. Its height has been estimated at 17,884 feet. The crater is 3 miles in circumference and 1000 feet deep. Forests cover the base of the mountain, but its summit is mostly covered with snow.

POPPY, the common name for a species of herbaceous plant, all bearing large, brilliant, but fugacious flowers. The white poppy yields the

well-known opium of commerce. Most of the species are natives of Europe, and four are truly natives of Britain. They often occur as weeds in fields and waste places, and are frequently also cultivated in gardens for ornament. The seeds of the white poppy



Poppy.

a, The upper part of the stem with the flower. b, The lower part of the plant. c, The fruit.

yield a fixed harmless oil employed for culinary purposes; and the oil-cake is used for feeding cattle. The roots of the poppy are annual or perennial; the calyx is composed of two leaves, and the corolla of four petals; the stamens are numerous, and the capsule is one-celled, with several longitudinal partitions, and contains a multitude of seeds.

POPULATION, the power of propagation inherent in all organic life may be regarded as infinite. There is no one species of vegetable or animal which under favorable conditions as to space, climate, and food (that is to say, if not crowded and interfered with by others), would not in a small number of years overspread every region of the globe. To this property of organized beings the human species forms no exception. And it is a very low estimate of its power of increase if we only assume that, under favorable conditions, each generation might be double the number of the generation which preceded it. Taking mankind in the mass, the individual desire to contribute to the increase of the species may be held to be universal, but the actual growth of population is nowhere left to the unaided force of this motive, and nowhere does any community increase to the extent of its theoretical capacity, even though the growth of population has come to be commonly considered as an indispensable sign of the prosperity of a community. For one thing population cannot continue to increase beyond the means of subsistence, and every increase beyond actual or immediately attainable means, must lead to a destruction of life. But if population is thus actually limited by the means of subsistence, it cannot be prevented by these means from going further than these means will warrant; that is to say, it will only be checked or arrested after it has exceeded the means of subsistence. It becomes then an inquiry of great importance by what kind of checks population is actually brought up at the

point at which it is in fact arrested. This inquiry was first systematically treated in an Essay on the Principle of Population published in 1798 by the Rev. T. R. Malthus. Malthus points out that population increases in a geometrical, while the means of subsistence only increase in an arithmetical ratio. And in examining the bearing on each other of the different ratios of increase of human life, and of the means of supporting it, he has deduced a law to the proof of which a considerable portion of his work is devoted. This law is that the energy of reproduction raises above all the ordinary accidents of human life, and the inevitable restraints imposed by the various organizations of human society, so that in all the various countries and climates in which men have lived, and under all the constitutions by which they have been governed, the normal tendency of population has always been to press continuously upon the means of subsistence. Malthus divides the checks on the increase of population into two classes, preventive and positive; the one consisting of those causes which prevent possible births from taking place, the other of those which, by abbreviating life, cut off actual excesses of population. In a further analysis of these checks he reduces them to three—vice, misery, and moral restraint. The proof of his main position is historical and statistical. In regard to the subsidiary inquiry, the most striking point brought out is the rarity of moral restraint and the uniform action, in innumerable forms, of vice and misery. In order that the latter should be weakened in their action, and the former strengthened, it is desirable to have the general standard of living in a community raised as high as possible, and that all may look to the attainment of a position of comfort by the exercise of prudence and energy. The following figures may be given as approximately representing the density of population in the great divisions of the world (but some of the figures are mere estimates):

	Area in thousands of sq. miles	Pop. in millions	Density per sq. mile
Europe.....	3,861	390	100
Africa.....	12,124	197	16
Asia.....	16,217	789	47
Oceania.....	4,247	38	9
N. America..	9,035	104	11.5
S. America..	7,066	32	4.6

POPULIST PARTY, or PEOPLE'S PARTY, a political party organized at Cincinnati in May, 1891. On July 2, 1892, a national convention of the populist party met at Omaha, Neb., and nominated James B. Weaver of Iowa for president and James G. Field of Virginia for vice-president. The ticket received 22 electoral votes and a popular vote of 1,055,424. In the presidential campaign of 1896, the populist party nominated for president W. J. Bryan, who had already received the nomination of the democratic party, and for vice-president Thomas E. Watson of Georgia. In the campaign of

1900 the populist party again nominated for president W. J. Bryan, who was also the democratic nominee, and Charles A. Towne of Minnesota, but he subsequently withdrew, and the national executive committee of the populist party substituted Stevenson, who had already received the nomination by the democratic party for vice-president. It received 155 electoral votes.

PORBANDAR, a town of India, chief town of a native state of the same name, in the political agency of Kattyawar, Bombay. It is built on a creek on the s.w. coast of Gujerat, and has a brisk trade with Bombay and Malabar. Pop. 14,569. The state has an area of 535 sq. miles and a pop. of 72,077.

PORCH, an exterior appendage to a building, forming a covered approach to one of its principal doorways. The porches in some of the older churches are of two stories, having an upper apartment to which the name parvis is sometimes applied.—The porch was a public portico in Athens where the philosopher Zeno taught his disciples. Hence The Porch is equivalent to the School of the Stoics.

POR'CUPINE, a name of certain rodent quadrupeds. The body is covered, especially on the back, with the so-called quills, or dense solid spine-like structures, intermixed with bristles and stiff hairs. There are two incisors and eight molar teeth in each jaw, which continue to grow throughout life from permanent pulps. The muzzle is generally short and pointed, the ears short and rounded. The anterior feet possess four, and the hinder feet five toes, all provided with strong thick nails. The common or crested porcupine, found in Southern Europe and in Northern Africa, is the best-known species. When fully grown it measures nearly 2 feet in length, and some of its spines exceed 1 foot. Its general color is a grizzled dusky black. The spines in their usual position lie nearly flat, with their points directed backward; but when the animal is excited they are capable of being raised. The quills are loosely inserted in the skin, and may, on being violently shaken, become detached—a circumstance which may probably have given rise to the purely fabulous statement that the animal possessed the power of actually ejecting its quills like arrows or darts at an enemy. These animals burrow during the day, and at night search for food, which consists chiefly



Porcupine.

of vegetable matter. Of the American species, the Canadian or North American porcupine is the best known. It is about 2 feet long, and of slow and

sluggish habits. The quills in this species are short, and are concealed among the fur. The ears are short, and hidden by the fur. The tail is comparatively short. The genus of South America possesses a distinctive feature in the elongated prehensile tail, adapting it for arboreal existence. These latter forms may thus be termed "tree porcupines." In length the typical species of this genus averages 1½ foot, the tail measuring about 10 inches.

PORGIE, a fish of the family Sparidae, with an oblong body, scaly cheeks, and one dorsal fin, found off the coasts of the United States. It is one of the most important food fishes, and attains a length of 18 inches and a weight of 4 lbs.

PORK, the flesh of swine, is one of the most important and widely-used species of animal food. Pork is coarser and ranker than beef or mutton, but when of good quality and well cured it develops a richness and delicacy of flavor in marked contrast with the dryness and insipidity of other salted meat. The abundance and digestive quality of its fat renders it a suitable diet for cold climates. The swine was forbidden to be eaten by the Mosaic law, and is regarded by the Jews as especially typical of the unclean animals. Other Eastern nations had similar opinions as to the use of pork. Pork contains less fibrine, albuminous and gelatinous matter than beef or mutton.

POROSITY, the name given to a property possessed by all bodies, in consequence of which their molecules are not immediately contiguous to one another, but are separated by intervening spaces or pores.

PORPHYRIO, a genus of birds of the rail family found in Europe, Asia, and



Porphyrio.

Africa, and remarkable for the structure of its beak and the length of its legs. It feeds on seeds and other hard substances, and lives in the neighborhood of water, its long toes enabling it to run over the aquatic plants with great facility. It is about 18 inches long, of a beautiful blue color, the bill and feet red.

PORPHYRY, originally the name given to a very hard stone, partaking of the nature of granite, susceptible of a fine polish, and consequently much used for sculpture. It consists of a homogeneous felspathic base or matrix, having crystals of rose-colored felspar, called oligoclase, with some plates of blackish hornblende, and grains of oxidized iron ore imbedded, giving to the mass a speckled complexion. It is of a red, or rather of a purple and white color, more or less variegated, the

shades being of all gradation from violet to a claret color. Egypt and the East furnish this material in abundance. It also abounds in Minorca, where it is of a red lead color, variegated with black, white, and green. Pale and red porphyry, variegated with black, white, and green, is found in separate nodules in Germany, England, and Ireland. The art of cutting porphyry as practiced by the ancients appears to be now quite lost. In geology the term porphyry is applied to any unstratified or igneous rock in which detached crystals of felspar or some other mineral are diffused through a base of other mineral composition. The varieties of porphyry are known as felspar porphyry, claystone porphyry, porphyritic granite, and porphyritic greenstone.

PORPOISE, a genus of cetacean mammalia. The common porpoise is the smallest and most familiar of all Cetacea, and occurs plentifully off the British coasts and in the North sea. It attains average length of 5 feet. The front of the head is convex in form, and has the spiracle or blow-hole in the middle line. The eyes and ears are small. The caudal fin is horizontal and flattened. The neck is very short. The fore limbs project from the body. No hind limbs are developed. The teeth are small with blunted crowns. The stomach is in three portions. No olfactory nerves exist. The porpoise feeds almost entirely on herrings and other fish, and herds or "schools" of porpoises follow the herring shoals, among which they prove very destructive. An allied species is the



Porpoise.

round-headed porpoise, or "caaing whale" of the Shetlanders. These latter measure from 20 to 24 feet in length, and are hunted for the sake of the oil. See Caaing Whale.

PORT, a kind of wine. See Port Wine.

PORT, a harbor or haven, or place where ships receive and discharge cargo. A free port is one at which the goods imported are exempted from the payment of any customs or duties, as long as they are not conveyed into the interior of the country.

PORT, the name given to the left side of a ship (looking toward the prow), as distinguished from the starboard or right side. Formerly larboard was used instead of port.

PORTAGE, a term applied in Canada to a break in a chain of water communication, over which goods, boats, etc., have to be carried, as from one lake, river, or canal to another; or, along the banks of rivers, round waterfalls, rapids, etc.

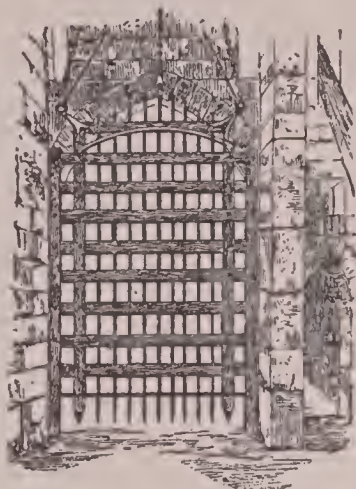
PORTAL CIRCULATION, a subordinate part of the venous circulation, belonging to the liver, in which the blood makes an additional circuit before it joins the rest of the venous blood. The

term is also applied to an analogous system of vessels in the kidney.

PORT ARTHUR, naval station and fine harbor on the Liaotung peninsula of n. e. China, taken by the Japanese in 1894, and acquired by Russia in 1898, and in 1905 taken for the second time by the Japanese, who retain control.

PORT-AU-PRINCE (por-tō-prans), capital of the Republic of Hayti. The chief exports are mahogany and redwood, coffee, and cocoa-nuts. Pop. 40,000.

PORTCULLIS, a strong grating of timber or iron, resembling a harrow,



Portcullis.

made to slide in vertical grooves in the jambs of the entrance-gate of a fortified place, to protect the gate in case of assault.

PORTE, Ottoman, **SUBLIME PORTE**, common term for the Turkish government. The chief office of the Ottoman empire is styled Babi Ali, lit. the High Gate, from the gate (bab) of the palace at which justice was administered; and the French translation of this term being Sublime Porte, hence the use of this word.

PORTER. See Brewing.

PORTER, David, American naval officer, was born in Boston, Mass., in 1780. In 1798 he entered the navy as midshipman on board the United States ship Constellation and participated in the war with the French. Next year he was made lieutenant and was assigned to the West Indies station, where he saw service against the pirates in those waters. In 1806 he was made master, and in 1812 captain. In the latter year he fought in the Essex the famous action with the Alert, which he sank in eight minutes. He made numerous captures during the war of 1812, both of British ships and Peruvian privateers, nearly destroying the British whale fisheries in the Pacific. From 1815 till 1824 Captain Porter was a member of the board of navy commissioners. In 1829 he was appointed consul of Algiers, and in the next year minister to Turkey, where he remained till his death. He was the author of a Journal of the Cruise of the Essex, and from his letters several other interesting books have been compiled. It can be said of him that the two most distinguished officers of the United States navy during the late war received their earliest training on his ship. These

two were his son and adopted son, David D. Porter, and David G. Farragut. He died in 1843.

PORTER, David Dixon, American admiral, was born at Philadelphia, in 1814. He saw his first battle in the Mexican navy at the time his father was chief in command of that service, and in 1829, he became a midshipman in the United States navy. He served in the Mediterranean station till 1835, at which time he was assigned to the United States coast survey corps. On the outbreak of the civil war he had attained the rank of commander. In January, 1863, he captured Arkansas Post, and in April destroyed the Grand Gulf batteries. At this time he was made rear-admiral, and had command of all the naval forces on the Mississippi river. After the fall of Vicksburg he assisted Banks in his Red river expedition in 1864. The same year saw him transferred to the James river in Virginia, and he was employed in the two attacks on Fort Fisher (in the second one of which the fort was captured), besides other important expeditions. At the close of the war he was made vice-admiral, and in 1866 he became superintendent of the naval academy of Annapolis, Md. In 1870, on the death of Admiral Farragut, he became admiral (commander-in-chief) of the navy. Admiral Porter wrote several books, among them being Life of Commodore David Porter, Incidents and Anecdotes of the Civil War, History of the Navy in the War of the Rebellion, and two works of fiction. He died in 1891.

PORTER, Fitz-John, American soldier, was born at Portsmouth, N. H., in 1822. He served in the Mexican war with General Scott, being wounded in the battles around the City of Mexico. He was twice brevetted for gallantry during the war, and in 1849 he was appointed instructor of cavalry and artillery at West Point. In 1861 he had reached the rank of colonel in the regular army, and on the beginning of hostilities was made brigadier-general of volunteers. At the second battle of Bull Run, Porter was ordered to attack Jackson's flank, but failed to move (as he alleged) on account of Longstreet being immediately in his front. Pope laid the blame of his defeat on Porter's inactivity, and even charged him with treachery. Soon after this event McClellan was restored to the chief command, and General Porter participated in the battle of Antietam. On November 27, 1862, he was tried by court-martial on a charge of disobedience of orders, and after a tedious investigation was cashiered from the army. Appeal was taken, and a board of inquiry was called to proceed with a rehearing of the case, and Porter was in 1878 declared blameless. In Cleveland's administration, a bill was passed and signed by the president authorizing the restoration of Porter to the regular army, with the rank of colonel, the bill taking effect in 1886.

PORTER, Horace, American soldier and diplomat. He was born in 1837 at Huntingdon, Pa. At the reduction of Fort Pulaski, Ga. (1862), he was the chief of ordnance and artillery, and

earned the brevet rank of captain. He participated in the Tennessee campaign during which he fought at the battle of Chickamauga and took part in the defense of Chattanooga. On April 4, 1864, he was promoted to be lieutenant-colonel and was assigned to the staff of General Grant. On March 13, 1865, he received the brevet rank of brigadier-general in the regular army. When Grant was elected to the Presidency Porter became his private secretary. In 1873 he resigned from the army to become vice-president of the Pullman Car company, and during the following years he filled executive positions on several railroads. In 1897 President McKinley appointed him ambassador to France. His writings include *West Point Life*; *Campaigning with Grant*; and the articles on *Five Forks* and the *Pursuit of Lee* and *The Surrender at Appomattox Court House*, in *Battles and Leaders of the Civil War*.

PORTER, Jane, was born at Durham, England in 1776, and made her first essay in literature in 1803 by the publication of *Thaddeus of Warsaw*, an historical romance, which became extremely popular and secured her European fame. A still greater success attended her *Scottish Chiefs* (1809). She died at Bristol 1850.

PORTER, Noah, D.D., LL.D., an American philosopher and writer, born at Farmington, Conn., in 1811. Graduating at Yale college in 1831, he was ordained pastor of the Congregational church, New Milford, Conn., in 1836, and in 1843 settled at Springfield, Mass. Returning to Yale in 1846 as professor of metaphysics and moral philosophy, he was elected president in 1871, and continued to hold that position till 1886. Among his chief works are *Historical Discourses*, the *Human Intellect*, *Books and Reading*, the *Science of Nature* versus the *Science of Man*, *The Elements of Intellectual Philosophy*, *The Elements of Moral Science*, *Bishop George Berkeley*, and *Kant's Ethics*. Dr. Porter also edited an edition of *Webster's Dictionary*. He died in 1892.

PORT HURON, a city on the St. Clair river, Michigan, where it leaves Lake Huron. It has an extensive lumber trade, ship-yards, saw, flour, and planing mills, etc., and is connected with Sarnia in Canada by ferries and a railroad passing under the river. Pop. 21,972.

PORTICO, in architecture, a kind of porch before the entrance of a building fronted with columns, and either projecting in front of the building or receding within it. Porticoes are styled tetrastyle, hexastyle, octostyle, decastyle, according as the columns number four, six, eight, or ten.

PORTLAND, a seaport and largest city in Maine, on a peninsula at the western extremity of Casco bay, a picturesque and well-built city, with handsome public buildings, and abundance of trees in many of its streets. Locomotive cars, etc., are made; there are also ship building yards, glass-works, potteries, and rope-walks; and the refining of petroleum and sugar is extensively carried on. The trade both maritime and inland is extensive, Portland

being the terminus of important railroads. The principal exports are timber, fish, beef, butter, etc. Pop. 60,242.

PORTLAND, the chief city of Oregon, situated on the left bank of Willamette river, about 12 miles from its confluence with the Columbia. It is the terminus of the Northern Pacific, Union Pacific, Great Northern, and the Southern Pacific railways, and is at the head of ship navigation, having regular steam communication with British Columbia and San Francisco. Pop. 1909 about 250,000.

PORTLAND BEDS, in geology, a division of the upper Oolites occurring between the Purbeck beds and the Kimmeridge clay, consisting of beds of hard oolitic limestone and freestone interstratified with clays and resting on light-colored sands which contain fossils, chiefly mollusca and fish with a few reptiles. They are named from the rocks of the group forming the Isle of Portland in Dorsetshire, from whence they may be traced through Wiltshire as far as Oxfordshire.

PORTLAND CEMENT, a well-known cement, so called from its resemblance in color to Portland stone. It is made from chalk and gault clay in definite proportions. These materials are intimately mixed with water, and formed into a sludge. This is dried, and when caked is roasted in a kiln till it becomes hard. It is afterward ground to a fine powder, in which state it is ready for market. This cement is much employed along with gravel or shivers for making artificial stone. A month after it is set it forms a substance so hard as to emit a sound when struck.

PORTLAND STONE is an oolitic limestone occurring in great abundance in the Isle of Portland, England. It is one of the members of the Portland Beds, and is much used in building, being soft when quarried, but hardening on exposure to the atmosphere.

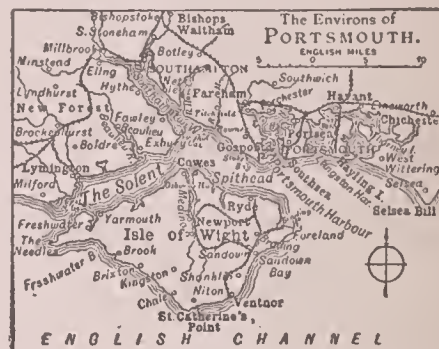
PORTO-RICO, one of the larger West India islands, the fourth in size of the Antilles, east of Hayti; area, with subordinate isles, 3596 sq. miles. The island is beautiful and very fertile. A range of mountains, covered with wood, traverses it from east to west, averaging about 1500 feet in height, but with one peak 3678 feet high. In the interior are extensive savannahs; and along the coast tracts of fertile land, from 5 to 10 miles wide. The streams are numerous, and some of the rivers can be ascended by ships to the foot of the mountains. There are numerous bays and creeks. The chief harbor is that of the capital, San Juan de Porto Rico; others are Mayaguez, Ponce, and Arecibo. The climate is rather healthy except during the rainy season (Sept.—March). Gold is found in the mountain streams. Copper, iron, lead, and coal have also been found; and there are salines or salt ponds. The chief products are sugar, rum, molasses, coffee, cotton, tobacco, hides, live-stock, dye-woods, timber, rice, etc. Discovered by Columbus in 1493, it was settled by the Spaniards in 1510, who ceded it to the United States in 1898. Pop. 953,243.

PORTO-RICO, San Juan de, the capital and principal seaport of the above island, on its north coast, stands

upon a small island connected with the mainland by a bridge, is surrounded by strong fortifications, and is the seat of the government and superior courts of the island. The harbor is capable of accommodating ships of the largest size. Pop. 32,048.

PORT SAID, a town of Egypt, on the Mediterranean, at the northern entrance of the Suez Canal. It was begun simultaneously with the canal in 1859, being designed for its terminal port. There is an outer harbor formed by two piers jutting out into the sea, each terminated by a small lighthouse. This admits large ocean steamers, which thus sail into the inner harbor and from it into the canal. Near the entrance to the inner harbor is a lofty lighthouse with a powerful light. Pop. 42,095.

PORTSMOUTH, the principal station of the British navy, a seaport, municipal county, and parl. borough of England, in Hampshire, on the southwest extremity of the island of Portsea. The royal dockyard covers an area of about 500 acres, and is considered the largest and most magnificent establishment of the kind in the world. A series of hills, 4 miles to the north of Portsmouth, and commanding its front to the sea, are well fortified with strong forts. On the



Gosport side a line of forts extends for 4 miles. The municipal and parliamentary borough includes nearly the whole of the island of Portsea. It sends two members to the House of Commons. Pop. 189,160.

PORTSMOUTH, a seaport in Rockingham co., New Hampshire, on the right bank of the Piscataqua, 3 miles above its mouth in the Atlantic, 50 miles north by east of Boston. It has long been noted for its skill in naval architecture, and for maritime enterprise. It is the seat of a government navy-yard, and the harbor is one of the safest and most commodious in the United States. Pop. 12,237.

PORTSMOUTH, a seaport town in Norfolk co., Virginia, at the mouth of the Elizabeth, 88 miles e.s.e. Richmond; has a military academy and a harbor allowing ships of the heaviest burden to come to the wharfs. At Gosport, a suburb, are a navy-yard, dry dock, and naval hospital. Pop. 19,115.

PORTSMOUTH, a town in Scioto co., Ohio, on the Ohio; has extensive iron manufactures. Pop. 20,146.

PORTSMOUTH, TREATY OF, in accordance with the proposal of President Roosevelt in May, 1905, after nearly 16 months of war, Russia and Japan named their plenipotentiaries to end the war and conclude peace. The meeting

took place at Portsmouth, N. H., on September 5th. The treaty was signed by the plenipotentiaries and was approved by the Emporor of Japan and the Czar of Russia on the 16th of September.

POR'TUGAL, a kingdom in the southwest of Europe, forming the west part of the Iberian peninsula; bounded east and north by Spain, and west and south by the Atlantic; greatest length, north to south, 345 miles, greatest breadth, 140 miles. Seven old provinces: Minho, Trás-os-Montes, Beira (Upper and Lower), Estremadura, Alemtejo, and Algarve now form seventeen districts, total area 34,462 sq. miles, population, 5,021,657 in 1906. Add to these the Azores (921 sq. miles; population, 256,474), and Madcira (315 sq. miles; population, 150,528), which gives a grand total of 35,698 sq. miles, and a population of 5,428,659. The colonial possessions of Portugal consist of—in Asia—Goa, Salsette, Damaun, and Diu, all in Hindustan, Macao in China, and possessions in the Indian Archipelago, having together an area estimated at 9000 sq. miles and a population estimated at 941,000; in Africa—Cape Verd, St. Thomas, and Prince's Islands, the Guineasettlements, Angola, Mozambique and dependencies, with an aggregate area of 792,000 sq. miles, and an estimated population of 8,197,790. The total area of the Portuguese possessions, therefore, amounts to 801,000 sq. miles, the population to nearly 9,250,000.

Portugal is only partially separated from Spain by natural boundaries. Its shape is nearly that of a parallelogram. The coast-line, of great length in proportion to the extent of the whole surface, runs from the north in a general s.s.w. direction till it reaches Cape St. Vincent, where it suddenly turns east. The only harbors of importance, either from their excellence or the trade carried on at them, are those of Lisbon, Oporto, Setubal, Faro, Figueira, Aveiro, and Vianna. The interior is generally mountainous, a number of ranges stretching across the country, forming a succession of independent river basins, while their ramifications form the watersheds of numerous subsidiary streams, and inclose many beautiful valleys. The minerals include lead, iron, copper, manganese, cobalt, bismuth, antimony, marble, slate, salt, saltpeter, lithographic stones, mill-stones, and porcelain earth. No rivers of importance take their rise in Portugal. The Minho in the north, the Douro, and the Tagus all flow from east to west. The Guadiana is the only large river which flows mainly south. Portugal can only claim as peculiarly her own the Vouga, Mondego, and Sado.

The climate is greatly modified by the proximity of the sea and the height of the mountains. In general the winter is short and mild, and in some places never completely interrupts the course of vegetation. In the mountainous districts the loftier summits obtain a covering of snow, which they retain for months; but south of the Douro, and at a moderate elevation, snow does not lie long. The mean annual temperature of Lisbon is about 56°. Few countries have a more varied flora than Portugal.

Many of the mountains are clothed with forest trees, among which the common oak and the cork oak are conspicuous. In the central provinces chestnuts are prevalent; in the south both the date and the American aloe are found; while in the warmer districts the orange, lemon, and olive are cultivated with success. The mulberry affords food for the silkworm, and a good deal of excellent silk is produced. The vine, too, is cultivated, and large quantities of wine are exported. Agriculture generally, however, is at a low ebb, and in ordinary years Portugal fails to raise cereals sufficient to meet its own consumption. Among domestic animals raised are mules of a superior breed, sheep, goats, and hogs. More horned cattle have been raised and of a better quality, and livestock now figures with timber and wine among the chief exports. The fisheries, so long neglected, have also been revived in recent years.

Manufactures are of limited amount, although they have been increasing of late years. They embrace woollens, cottons, silks, earthenware and porcelain, soap, paper, iron goods, hats, etc. The principal exports are wine, cork, cattle, timber, olive-oil, fruits, iron and copper pyrites, and wool; the principal imports are cereals, salt provisions, colonial produce, woolen, cotton, linen, and silk tissues, iron, steel, and other metals, and coal. The bulk of the trade is with Great Britain, France, and Brazil.

The crown is hereditary both in the male and female line. The constitution recognizes four powers in the state—the legislative, executive, judicial, and moderating. The last is vested in the sovereign. There are two chambers, the Chamber of Peers and the Chamber of Deputies. In 1885 a law was passed abolishing hereditary peerages by a gradual process. While the established religion is the Roman Catholic, other religions are tolerated. Conventual establishments were suppressed in 1834. Education, under a distinct ministry, is compulsory; but the law is not enforced, and the general state of education is low. The army, consisting of 30,000 men on the peace footing, is raised both by conscription and enlistment. The navy is as yet of insignificant strength.

The Phœnicians, Carthaginians, and Greeks early traded to this part of the peninsula, the original inhabitants of which are spoken of as Lusitanians, the country being called Lusitania. When the Spaniards finally wrested the country between the Minho and the Douro from Moorish hands, they placed counts or governors over this region. Alphonso I., defeated Alphonso, king of Castile, in 1137, and made himself independent. In 1139 he gained the brilliant victory of Ourique over the Moors, and was saluted on the field King of Portugal. The cortes convened by Alphonso in 1143 at Lamego confirmed him in the royal title, and in 1181 gave to the kingdom a code of laws and a constitution. The succeeding reigns from Alphonso I. to Dionysius (1279) are noteworthy chiefly for the conquest of Algarve (1251) and a conflict with the pope, who several times put the king-

dom under interdict. Dionysius' wise encouragement of commerce, agriculture, manufactures, and navigation laid the foundation of the future greatness of Portugal. He liberally patronized learning, and founded a university at Lisbon, transferred in 1308 to Coimbra. He was succeeded by Alphonso IV., who in conjunction with Alphonso II. of Castile defeated the Moors at Salado in 1340. He murdered Inez de Castro, the wife of his son Pedro (1355) who succeeded him. Dying in 1367, Pedro I. was succeeded by Ferdinand, on whose death in 1383 the male line of the Burgundian princes became extinct. His daughter Beatrice, wife of the King of Castile, should have succeeded him; but the Portuguese were so averse to a connection with Castile that John I., natural son of Pedro, grand-master of the order of Avis (founded in 1162), was saluted king by the estates. In 1415 he took Ceuta, on the African coast, the first of a series of enterprises which resulted in those great expeditions of discovery on which the renown of Portugal rests. In this reign were founded the first Portuguese colonies, Porto Santo (1418), Madeira (1420), the Azores (1433), and those on the Gold coast. The expeditions of discovery were continued with ardor and scientific method. Bartolommeo Diaz doubled the Cape of Good Hope in 1487, and Vasco da Gama reached India in 1498. In 1500 Cabral took possession of Brazil. While these great events were still in progress John II. was succeeded by his cousin Emanuel (1495-1521). The conquests of Albuquerque and Almeida made him master of numerous possessions in the islands and mainland of India, and in 1518 Lope de Soares opened a commerce with China. Emanuel ruled from Babelmandeb to the Straits of Malacca, and the power of Portugal had now reached its height. In the reign of John III., son of Emanuel (1521-57), Indian discoveries and commerce were still further extended. The Inquisition was introduced (1536), and the Jesuits were admitted (1540). Sebastian, the grandson of John III., who had introduced the Jesuits, having had his mind inflamed by them against the Moors of Africa, lost his life in the battle against these infidels (1578), and left his throne to the disputes of rival candidates, of whom the most powerful, Philip II. of Spain, obtained possession of the kingdom by the victory of Alcantara. Portugal continued under the dominion of Spain till 1640, and her vast colonial possessions were united to the already splendid acquisitions of her rival. But these now began to fall into the hands of the Dutch, who, being provoked by hostile measures of Philip, attacked the Portuguese as well as the Spanish possessions both in India and America. They deprived the Portuguese of the Moluccas, of their settlements in Guinea, of Malacca, and of Ceylon. They also acquired about half of Brazil, which, after the re-establishment of Portuguese independence, they restored for a pecuniary compensation. In 1640, by a successful revolt of the nobles, Portugal recovered her independence, and John IV., duke of Braganza, reigned till 1656, when he

was succeeded by Alphonso VI. On the accession of Maria Francisca Isabella, eldest daughter of Joseph, in 1777, the power was in the hands of an ignorant nobility and a not less ignorant clergy. In 1792, on account of the sickness of the queen, Juan Maria José, prince of Brazil (the title of the prince-royal until 1816), was declared regent. His connections with England involved him in war with Napoleon; Portugal was occupied by a French force under Junot, and the royal family fled to Brazil. In 1808 a British force was landed under Wellington, and after some hard fighting the decisive battle of Vimeira took place (August 21), which was followed by the Convention of Cintra and the evacuation of the country by the French. The French soon returned, however; but the operations of Wellington, and in particular the strength of his position within the lines of Torres Vedras, forced them to retire. The Portuguese now took an active part in the war for Spanish independence. On the death of Maria in 1816, John VI. ascended the throne of Portugal and Brazil, in which latter country he still continued to reside. A revolution in favor of constitutional government was effected without bloodshed in 1820, and the king invited to return home, which he now did. In 1822 Brazil threw off the yoke of Portugal, and proclaimed Dom Pedro, son of John VI., emperor. John VI. died in 1826, having named the Infanta Isabella Maria regent. She governed in the name of the Emperor of Brazil, Dom Pedro IV. of Portugal, who granted a new constitution, modeled on the French, in 1826. In 1831 Dom Pedro resigned the Brazilian crown, and returning to Europe succeeded in overthrowing Dom Miguel, and restoring the crown to Maria in 1833, dying himself in 1834. In 1836 a successful revolution took place in favor of the restoration of the constitution of 1820, and in 1842 another in favor of that of 1826. Maria died in 1853. Her husband, Ferdinand of Saxe-Coburg (Dom Ferdinand II.), became regent for his and her son, Pedro V., who himself took the reins of government in 1855. Pedro died in 1861, and was succeeded by his brother, Louis I. Louis died in 1889, and was succeeded by his son, Carlos I. During these latter reigns the state of Portugal has generally been fairly prosperous. On Feb. 1st, 1908, King Carlos and the Crown Prince Luig Philippe were killed and the Infant Manuel slightly injured by assassins as the king and queen and their two sons were returning in their carriage to the palace. On Feb. 3rd, Manuel II. was crowned king.

PORT WINE is a very strong, full-flavored wine produced in the upper valley of the Douro, Portugal, and has its name from the place of shipment, Oporto. It is slightly astringent, and has a color varying from pink to red. It requires three or four years to mature, and with age becomes tawny; it receives a certain proportion of spirit to hasten the process of preparation. The vintage begins early in September and extends into October. Large quantities of artificial port are made.

POSEN, a fortified town in Prussia, capital of the province of the same name. The most noteworthy public buildings are the cathedral, in the Gothic style (1775), the town parish church, a fine building in the Italian style, both Roman Catholic; the town-house (1508), with a lofty tower; the Raczyński library; the municipal archive building, etc. The manufactures consist chiefly of agricultural machines, manures, woolen and linen tissues, carriages, leather, lacquerware, etc.; besides breweries and distilleries. Pop. 117,014.—The province is bounded by west Prussia, Russian Poland, Silesia, and Brandenburg; area, 11,178 sq. miles.

POSIDONIUS, a Stoic philosopher, born in Syria, about 135 B.C. He settled as a teacher at Rhodes, whence he is called the Rhodian. The most distinguished Romans were his scholars, and Cicero was initiated by him into the Stoic philosophy. Removing to Rome in 51 B.C., he died not long after. In his physical investigations he was more a follower of Aristotle than of the Stoic school.

POSITIVE, in photography, a picture obtained by printing from a negative, in which the lights and shades are rendered as they are in nature. See Photography.

POSITIVE PHILOSOPHY, or **POSITIVISM**, is the name given by Auguste Comte to the philosophical and religious system promulgated by him (chiefly in his *Cours de Philosophie Positive*, 1830-42, and his posthumous *Essays on Religion*). The distinguishing idea which lies at the root of this two-fold system is the conception that the anomalies of our social system cannot be reformed until the theories upon which it is shaped have been brought into complete harmony with science. The leading ideas of Comte's philosophy are (1) the classification of the sciences in the order of their development, proceeding from the simpler to the more complex—mathematics, astronomy, physics, chemistry, biology, and sociology; and (2) the doctrine of the "three stages," or the three aspects in which the human mind successively views the world of phenomena, namely, the theological, the metaphysical, and the scientific.

POST-RESTANTE, a department in a post-office where letters so addressed are kept till the owners call for them. It is for the convenience of persons passing through a country or town where they have no fixed residence.

POST-GLACIAL. See Post-tertiary.

POST MORTEM ("after death"), a Latin term used as in the phrase post mortem examination, an inspection made of a dead body by some competent person in order to ascertain the cause of death.

POST-OFFICE, a department of the government of a country charged with the conveyance of letters, newspapers, parcels, etc. From the time of Cyrus the Elder down to the middle ages various rulers had concocted more or less effective systems of postal communication throughout their dominions; but the "post" as we know it today is an institution of very modern growth. The first traces of a postal system in England

are observed in the statutes of Edward III., and the postoffice as a department of government took its rise in the employment of royal messengers for carrying letters. The first English postmaster we hear of was Sir Brian Tuke, his date being 1533. In 1543 a post existed by which letters were carried from London to Edinburgh within four days, but this rate of transportation, rapid for that period, lasted but a short time. James I. improved the postal communication with Scotland, and set on foot a system for forwarding letters intended for foreign lands. In 1607 he appointed Lord Stanhope postmaster for England, and in 1619 a separate postmaster for foreign parts. Up to within a short time of the reign of Charles I., merchants, tradesmen, and professional men availed themselves of any means of conveyance that offered, or employed express messengers to carry their correspondence. The universities and principal cities had their own posts. The foreign merchants settled in London continued to send their foreign letters by private means long after the establishment of the foreign post. In 1632 Charles I. forbade letters to be sent out of the kingdom except through the post-office. In 1635 he established a new system of posts for England and Scotland. All private and local posts were abolished, and the income of the post-offices was claimed by the king. Interrupted by the civil wars, peace had no sooner been restored than a more perfect postal system was established. In 1683 a penny post was set up in the metropolis. During the government of William III. acts of parliament were passed which regulated the internal postal system of Scotland; and under Queen Anne, in 1711, the postal system of England was arranged on the method on which, with some modifications, it continued till near the middle of the 19th century. Sir Rowland Hill, the author of the system at present existing, gave the first intimation of his plan in a pamphlet in the year 1837. He soon had the satisfaction of seeing the legislature adopt his plan, in its principal features at least, and on the 10th January, 1840, the uniform rate of 1 d. per $\frac{1}{2}$ oz. for prepaid letters came into operation. The success of Rowland Hill's scheme was vastly favored by the invention of the adhesive postage-stamp, the idea of which would seem to be due to Mr. James Chalmers of Dundee. Subsequently many important improvements have been made in the management of the post-office business. One of these was the adoption of postal carriages on railways, by which the delivery of letters was greatly accelerated. These carriages are fitted with an apparatus into which letter-bags are thrown without stopping or even materially slackening the speed of the train; while the sorting of letters, etc., proceeds during the transit. The reduction of the cost of carriage, the great increase in the rapidity of transmission, the immense development of commerce, together with the increase of population, have had the effect of enormously increasing the work done by the post-office.

Other departments under the manage-

ment of the post-office in Great Britain. are the money-order departments, the savings-bank department, annuities and life assurance department, and telegraph department. For the annuities and life assurance department see Post-office Insurance. The money-order department was annexed to the post-office in 1838. By means of an inland money-order an amount, not exceeding \$50, can be transmitted to any person in any part of the United Kingdom and represented for payment at the post-office named in it within twelve months after the date of issue, otherwise it is legally void. At first the rates were much higher than they are now. Postal orders are now provided with counterfoils for retention by the sender.

Since 1861 post-office savings banks have been in operation in Britain; the deposits are paid over to the commissioners for the reduction of the national debt who allow interest at $2\frac{1}{2}$ per cent per annum. Not more than \$150 may be deposited by a person in any one year nor may the total amount so deposited exceed \$1000. France, Austria, Germany, Canada, and other countries also have the like savings banks.

The telegraph lines of the United Kingdom have been worked by the post-office since 1870. An act passed in 1868 authorized the postmaster general to buy up all existing lines, to make extensions and improvements as occasion requires, and to work them as part of the post-office business. A second, passed in 1869, practically gave the government a monopoly in telegraphing. The rate is 6d. for twelve words or less, and $\frac{1}{2}$ d. for every word afterward, the addresses of sender and receiver being both charged for.

In the English colonies of America before 1639 such postal facilities as existed were supplied by private enterprise. Letters from abroad were delivered at the wharf to those who called for them or sent to a near-by coffee-house for distribution. Benjamin Franklin was more identified with the Colonial post-office than any other man. In 1737 he was appointed postmaster of Philadelphia. He immediately systematized the department. In 1753 the delivery of letters by the penny post was begun. In 1792 rates of postage were fixed which remained unaltered for nearly half a century. They were: for 30 miles and under, 6 cents; over 30 miles and not exceeding 60 miles, 8 cents; over 60 and not exceeding 100 miles, 10 cents; and so on up to 450 miles and over, for which the charge was 25 cents. In 1851 the rate on letters not exceeding $\frac{1}{2}$ ounce in weight was reduced to 3 cents for distances under 3000 miles and 6 cents for distances above 3000 miles. In 1863 the element of distance as a factor in fixing the scale of rates was abolished and a uniform rate of 3 cents was established for letters not exceeding $\frac{1}{2}$ ounce in weight. In 1883 this rate was reduced to 2 cents.

In 1847 adhesive postage stamps were first introduced into the United States, but, on account of the high rate of postage and the provision allowing optional prepayment, they did not come

into general use until 1855, when the rates were reduced and prepayment required. In 1852 stamped envelopes were introduced and in 1872 postal cards were authorized. In 1879 double or reply postal cards were authorized, and in 1898 private mailing cards were allowed to be sent through the mails at the rate of one cent postage, subject to certain restrictions prescribed by the postmaster-general.

By an act of 1855 provision was made for a system of registration by which extra precaution is taken in the transmission of valuable letters and parcels upon payment of a fee of eight cents in addition to the regular postage. By an act of 1897, provision was made for indemnifying persons who lose registered letters and parcels of value, when the actual value of the article is less than \$25.

In 1864 the postal money order system was adopted. No single money order for more than \$100 may be issued.

The system of delivering mail by carriers at the houses and offices of persons to whom it is addressed was first introduced in 1863. In 1865 free delivery was extended to all places having a population of 50,000. In 1873 the system was extended to all places of 20,000 inhabitants and over, and in 1887 to cities of 10,000 inhabitants. Provision was also made in 1885 for special or immediate delivery of letters within certain limits upon the payment of a fee of 10 cents in the form of a special stamp. In 1896 the delivery of mail in rural districts was inaugurated.

In the United States all mail matter is divided into four classes. The first class includes letters, post-cards, and anything closed against inspection: postage, 2 cents each oz. or additional fraction of an oz.; post-cards, 1 cent; registered letters, 8 cents in addition to postage. Second class matter includes all newspapers, periodicals, etc., issued as frequently as four times a year: postage, one cent per lb. or fraction thereof. When the newspapers, etc., are sent by persons other than the publishers the charge is one cent for each four ounces. Mail matter of the third class includes books, circulars, proof-sheets, etc.: postage, 1 cent for each 2 oz.; limit of weight, 4 lbs. each package. The fourth class embraces merchandise and all matters not included in the other three classes: postage, 1 cent per oz.; limit of weight, 4 lbs. Prepayment of postage by stamps for all classes of matter is required. In most of the Central and South American states the postal system is as yet far from being well organized, though a somewhat better state of affairs prevails in Chile, Mexico, the Argentine Republic, and Brazil, in each of which there is also a system of state telegraphs.

In recent years an immense stride has been taken in the improvement of postal communication between different countries by the formation of the International Postal Union, the provisions adopted by which came into force in 1875. The Union has been greatly enlarged since that time; and only a few countries or regions now remain outside of it, such as China,

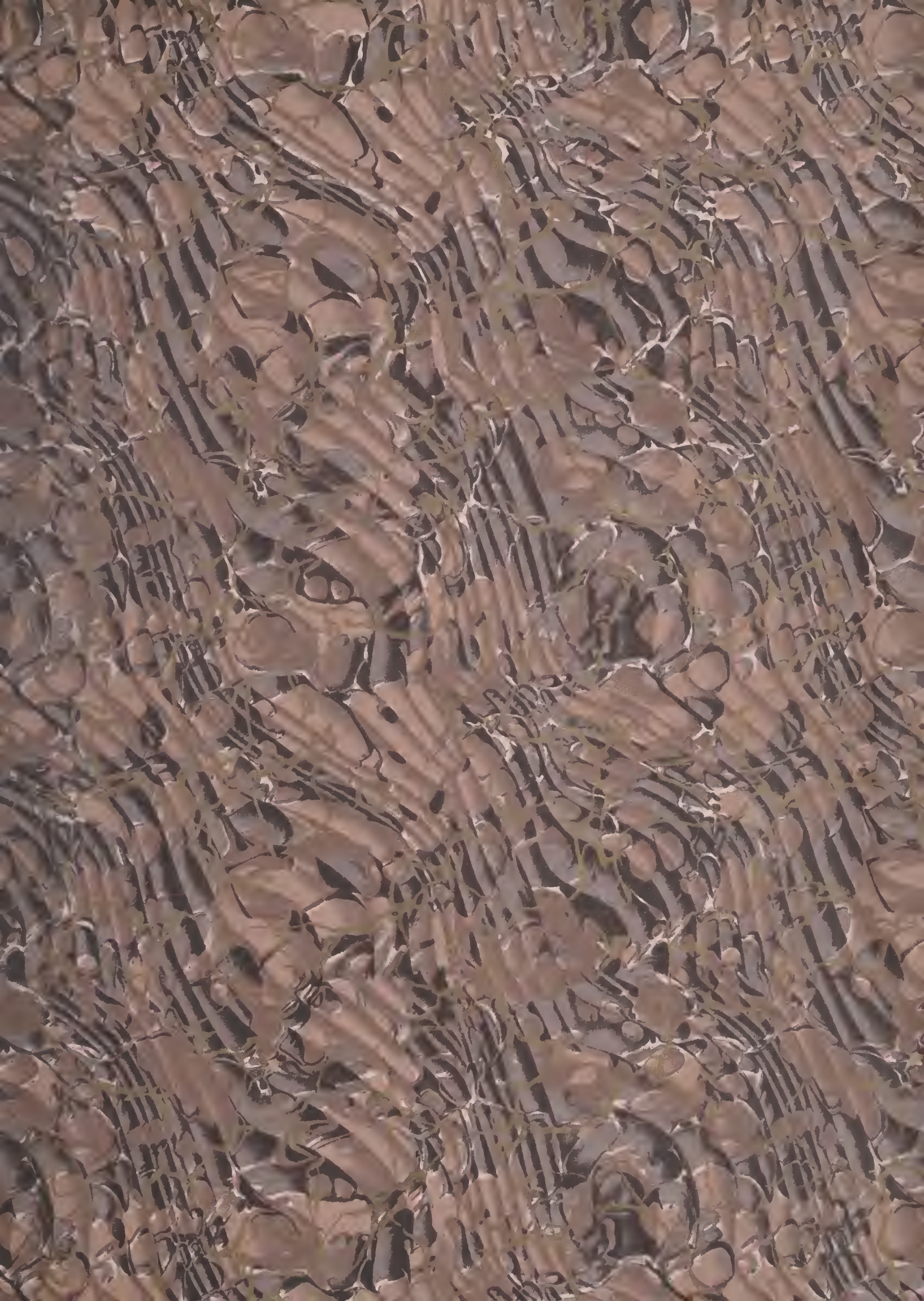
Abyssinia, Arabia, etc. All the countries in the Union have a uniform charge for letters, etc., passing between them. Practically an ounce letter (new rule put in force Oct. 1, 1907) is carried to any part of the world for five cents and a post card for two cents. In 1908 a two-cent postage rate between the United States and Great Britain went into effect.

POST-PLEIOCENE, or **POST-PLIOCENE**, in geology, same as Pleistocene.

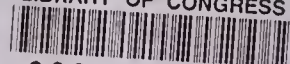
POST-TERTIARY, in geology, the Lyellian term for all deposits and phenomena of more recent date than the Norwich or mammaliferous crag. It may be restricted so as only to include accumulations and deposits formed since the close of the glacial or bolder drift systems, and has been divided into three sections—historic, pre-historic, and post glacial. The first comprises the peat of Great Britain and Ireland, fens, marshes river-deposits, lake-silts, accumulations of sand-drift, etc., containing human remains, canoes, metal instruments, remains of domestic animals, etc. The pre-historic comprises similar, or nearly similar deposits, but the remains found in them are older, comprising stone implements, pile-dwellings, and extinct animals, as the Irish deer, mammoth, etc. To the post-glacial belong raised beaches, with shells of a more boreal character than those of existing seas, the shell-marl under peat, many dales and river valleys, as well as the common brick-clay, etc., covering submarine forests or containing the remains of seals, whales, the mammoth, rhinoceros, urus, hyæna, hippopotamus, etc.

POTASH, or **POTASSA**, an alkaline substance obtained from the ley of vegetable ashes which is mixed with quicklime and boiled down in iron pots, and the residuum ignited, the substance remaining after ignition being common potash. It derives its name from the ashes and the pots (called potash kettles) in which the lixivium is (or used to be) boiled down. An old name was vegetable alkali. Potash in this crude state is an impure carbonate of potassium which when purified is known in commerce as pearl-ash. It is used in the making of glass and soap, and large quantities of it are now produced from certain "potash minerals" (especially carnallite), instead of from wood ashes. What is known as caustic potash (hydrate of potassium, is prepared from ordinary potash. It is solid, white, and extremely caustic, eating into animal and vegetable tissues with great readiness. It changes the purple of violets to green, restores reddened litmus to blue and yellow tumeric to reddish-brown. It rapidly attracts humidity from the air and becomes semi-fluid. It is fusible at a heat of 300°, and is volatilized at low ignition. It is used in surgery under the name of lapis infernalis or lapis causticus for destroying warts, fungoid growths, etc., and may be applied beneficially to the bites of dogs, venomous serpents, etc. In chemistry it is very extensively employed, both in manufactures and as an agent in analysis. It is the basis of the common soft soaps, for which purpose, however, it is not used in its pure state.





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